NATUR CYMRU
Nature of Wales

Number/Rhif 47 • Summer /Haf 2013

Nature at sea special

- Wildflower meadows
- Adfer gorgors
- Honeybees
- Herons
- Books, news, comment

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Puffin with Sand Eels by Sharon Whitley (see Art Competition, page 52). Because this issue has a marine theme we thought Sharon's painting would be perfect for the cover. Look out for the other winners throughout the year.

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GOLYGYDDOL EDITORIAL

Rwyf wedi bod yn mwynhau darllen hanes Ann Mark yn cael ei magu ar ynys (td. 44). Ronald Lockley, awdur a ysgrifennodd lawer am ynysoedd a bywyd gwyllt Cymru, oedd ei thad. Yn yr 1950au, prynodd Orielton House. Yno yr ysgrifennodd ei lyfr enwog *Private Life of the Rabbit*, a sefydlodd y tŷ fel canolfan astudiaethau maes. Yn 1970 daeth Robin Crump i'r ganolfan, gan agor llygaid myfyrwyr di-rif i natur am fwy na 30 mlynedd. Mae ei ymchwil tra manwl i Serenigau mewn pyllau glan môr – gwaith sy'n peri i rywun feddwl – yn un o nifer o erthyglau ar faterion morol.

Yn y lleill, mae Blaise Bullimore yn edrych yn fanwl ar hynt a helynt parthau cadwraeth morol, mae Pippa Moore yn dangos fel mae pobl yn gwirioni ar ddal crancod, ac Ivor Rees yn ymchwilio i'r datblygiadau sy'n mynd rhagddynt ar garlam ym maes ynni adnewyddadwy ar y môr.

Mewn cyflwyniad hiraethus i'w herthygl am y ffordd tuag at ddyfodol di-garbon, y diffyg pobl yn y dirwedd y mae'n cerdded drwyddi sy'n taro Julie Bromilow. Am fwy na chanrif mae'r boblogaeth wedi bod yn llifo o gefn gwlad, gan ei adael i anifeiliaid

Darren Boxer

Madfall ddŵr balfog ar Gwpan Robin Goch yng Ngardd Fotaneg Genedlaethol Cymru.
Palmate newt on Scarlet elf cup fungi in the National Botanic Garden of Wales.

sy'n pori ac ymwelwyr. Mae Matt Sutton yn disgrifio'r sialensiau sy'n wynebu gweirgloddiau blodeuog traddodiadol a'u perchenogion. Mae'n un o garfan gynyddol o bobl sydd, drwy weithgareddau economaidd sy'n gynaliadwy yn amgylcheddol, yn ceisio dod â bywyd, dynol ac arall, yn ôl i gefn gwlad.

Mae Julian Jones yn disgrifio'r ffawd sy'n wynebu un werddon fach o laswelltir cyforiog o fywyd gwyllt, gan ein hatgoffa bod yr erydu ar harddwch naturiol yn parhau er gwaethaf y mesurau diogelu. Mae diflaniad gweirglodd flodeuog yn edefyn arall wedi'i dynnu o'r ffabrig, ac mae'r crychau sy'n ymledu o hynny yn ymestyn y tu hwnt i'r safle ei hun, gan effeithio ar wenyn unigol a phoblogaethau o wenyn cymdeithasol ar draws yr ardal.

Mae gwenyn yn llenwi bwlch ecolegol hanfodol, ac i gydnabod hynny cafodd canolfan genedlaethol cadw gwenyn ei sefydlu. Mae ei chyfarwyddwr, Pete Barrar, yn disgrifio'r bygythiadau sy'n wynebu gwenyn mêl a'r hyn y mae'r Ganolfan newydd yn ei wneud i fynd i'r afael â nhw. Disgrifir enghraifft arall o'r hyn sy'n cael ei wneud i sicrhau gwelliannau gwirioneddol i'r amgylchedd, prosiect i adfer 33 ha o gyforgorsydd a gorgorsydd, gan Gethin Davies.

Yn olaf, rwyf am grybwyll dau ddarn disgrifiadol am yr amgylchedd naturiol. Mae erthygl Linda Auld am grëyr glas ar lyn yn cyfleu'r aderyn a'r gwyliwr yn berffaith. Gwnaeth wythnos Eloise Williams ar Ynys Bŷr imi wenu mewn pleser. Mae hefyd yn dod â mi'n ôl at faterion morol, ac ynysoedd.

I have been enjoying reading Ann Mark's account of her island upbringing (p. 44). Her father Ronald Lockley, a prolific author on Welsh islands and wildlife, bought Orielton House in the 1950s, wrote his famous *Private Life of the Rabbit* there, and established it as a field studies centre. In 1970 Robin Crump arrived at the Centre, where he opened the eyes of innumerable students to nature for over 30 years. His meticulous and thought-provoking research into Cushion Stars in rock pools is one of a number of articles on matters marine in this issue.

In the others, Blaise Bullimore explores the unfolding saga of marine conservation zones, Pippa Moore taps into public enthusiasm for crabbing, and Ivor Rees investigates the rapidly developing scene of renewable energy at sea.

In an evocative introduction to her article on the route to a carbon-zero future, Julie Bromilow is struck by the absence of people in the landscape through which she walks. For more than a century the population has been draining from the countryside, leaving it to grazing animals and visitors. Matt Sutton describes the challenges facing traditional flower-rich meadows and their owners. He is one of a growing band of people who, through environmentally sustainable economic activities, are trying to bring life, human and non-human, back into the countryside.

Julian Jones describes the fate facing one small oasis of wildlife-rich grassland, a reminder that the erosion of natural beauty continues in spite of the safeguards. The disappearance of a flowery meadow is another thread pulled from the fabric, affecting solitary and social bee populations throughout the locality.

Bees fill an essential ecological niche, in recognition of which a national centre for beekeeping has been established. Its director, Pete Barrar, describes the threats facing honeybees and what the new Centre is doing to address them. Gethin Davies describes another example of what is being done to make real improvements to the environment, a project to restore 33ha of raised and blanket bog.

Finally, a quick mention of two descriptive pieces of writing about the natural environment. Linda Auld's heron at a pond conveys bird and observer perfectly. Eloise Williams' week on Caldey island made me smile with delight. It also brings me back to matters marine, and islands.

James Robertson

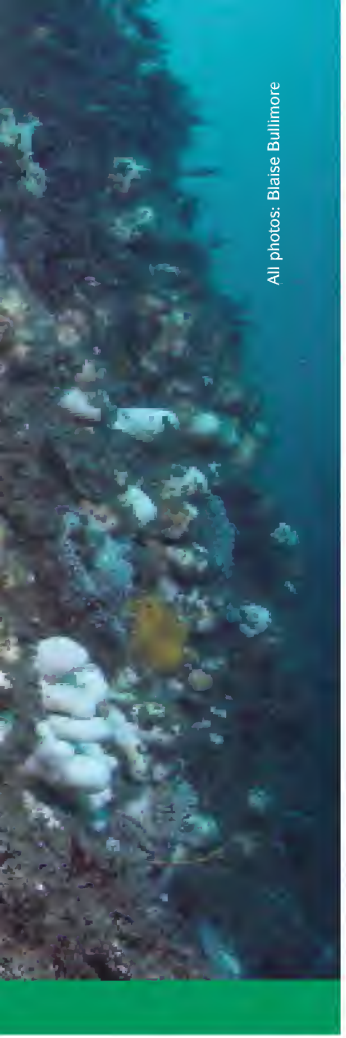
Marine nature conservation in Wales: *gloom or hope?*

The struggle to win the attention of the public and the will of politicians to the cause of the conservation of nature at sea has not been easy. **BLAISE BULLIMORE** *describes the slow progress that has been made, the part that Skomer Marine Nature Reserve has played, and the uncertain prospects for effective marine conservation management.*

I first got involved with marine nature conservation in my twenties. I've just turned sixty. Over three decades have flown by and Wales still doesn't have a single square metre of seabed completely protected from damaging and exploitative activities. That's right – not one fully protected marine wildlife area in Welsh waters, although the seas around NW Europe have long been amongst the most pressured and overexploited on the planet. Marine wildlife's low profile has doubtless hindered its protection, but the cause has been insufficient political will to take the action needed.

It takes effort to see most marine wildlife first hand. From the 1950s onwards, scuba diving brought the shallowest 40 metres into view, and this played a major part in the origins of British marine nature conservation. Marine biologists and recreational divers came to understand and appreciate the wealth of marine life and its vulnerability.

In 1965, diving members of the newly established Underwater Association



All photos: Blaise Bullimore

for Scientific Research wrote to the Natural Environment Research Council (NERC), the parent body of the Nature Conservancy (predecessor of the current nature conservation agencies) recommending that some subtidal areas be set aside for protection. Skomer was one of three locations specifically suggested.

The roots of marine nature conservation in Wales can be traced to the Field Studies Council's (FSC) Pembrokeshire Dale Fort Field Centre (DFFC) in the late 1960s, and it too was triggered by scuba diving. Increasing numbers of professional marine scientists visiting DFFC, with its developing focus on subtidal biology, coincided with the rapid development of recreational diving. Collection of shellfish and curios by divers landing at nearby Martin's Haven had become conspicuous and a point of conflict with local fishermen. This combination fostered a growing awareness that effective environmental stewardship might be as necessary in the sea as on land.

Dr Robin Crump joined DFFC for a year in 1969 and promptly set about organising underwater ecology courses for divers. These were welcomed, and attended by senior officers of the British Sub-aqua Club and Welsh Association of Sub-aqua Clubs (WASAC). Through these courses DFFC staff developed a broad picture of the area's subtidal ecology around the Dale and Marloes peninsulas. In 1971 the FSC's annual report recorded that under Robin's successor, Peter Hunnam, every course was booked to capacity.

The Centre's staff began a dialogue with the Nature Conservancy and Skomer Island's managers, the West Wales Naturalists Trust, to consider how an 'underwater nature reserve' might be established. The following year NERC invited DFFC to submit data to support the case for such reserves.

Skomer Island had become a National Nature Reserve for its nesting sea birds in 1959. Despite the sea's importance as the food source for the island's nesting birds, the marine environment had little respect: one early island warden recorded how empty food tins were thrown into the sea to dispose of them!

Following pressure from concerned organisations and individuals and parliamentary questions, NERC convened a working party on marine wildlife conservation. Its 1973 report concluded that there was insufficient ecological knowledge or evidence of risk to justify designation of marine reserves. It also forecast difficulties securing engagement by fisheries managers. Although there was a shortage of information at that time, these impediments – now excuses – are still alive and well.

A scientific seminar on marine conservation was convened at North Wales' Menai Bridge marine laboratory. Agreements were made to start tackling the problems and the Skomer/Martin's Haven area was one of the few locations discussed as a potential marine protected area (MPA).

In Pembrokeshire, Peter Hunnam and colleagues surveyed underwater habitats from Gateholm, around Skomer, to east of Martin's Haven, confirming the presence of a wide diversity of habitats and species.

Skomer becomes a voluntary marine reserve

By 1974 a steering committee was established to develop a voluntary marine reserve. On declaration of the Skomer Marine Reserve (SMR) in 1976, it evolved into the ambitiously named Management Committee, with Robin Crump as Scientific Secretary and WASAC providing the chairman.

The steering committee had initially struggled to engage the South Wales Sea Fisheries Committee

Broad or pink sea fans (*Eunicella verrucosa*) are one of the few marine invertebrates specifically identified for protection in the Wildlife and Countryside Act, but colonies are disappearing in the Skomer MNR.

Sea slug *Okenia elegans*

(SWSFC - the local fisheries management body) until the intervention of Pembrokeshire-based SWSFC member Paul Raggett. The Committee gave an assurance that there was no intention at that time to try and curtail the then current 'traditional' pot-fishing effort as there was no evidence of harm - not that anyone had looked for any evidence of effects! Although these important caveats were recorded, they have been overlooked by the fishing industry ever since.

However, scallop-dredging impacts were a worry. Divers were able to see the damage which dragging over a ton of toothed scallop dredges caused to the seabed and its wildlife, and it became a potent focus for conservation campaigns, but the SWSFC wanted strong evidence that dredging caused damage in the proposed Marine Nature Reserve (MNR). In 1985, with SWSFC support and cooperation from a local fisherman, an experimental investigation of dredging's impacts was undertaken. The SWSFC accepted the resulting evidence and introduced a byelaw prohibiting dredging, beam trawling and collecting scallops by any method before the statutory MNR was legally designated. The consequential conservation benefits are still accumulating.

Despite a management plan, an inclusive Management Committee and the distribution of an SMR leaflet, the voluntary reserve's success was expected to be limited as there was neither staff nor resources for management. Consequently the SMR Committee welcomed the 1981 Wildlife and Countryside Act (WCA) provisions for statutory MNRs and the inclusion of Skomer in the Nature Conservancy Council's (NCC) list of the first seven proposed MNRs.

Establishment of a statutory Marine Nature Reserve

A consultation on a proposed statutory MNR around Skomer and the Marloes Peninsula began in 1987 with the NCC making great efforts to liaise with consultees and Skomer Marine Reserve users. The proposal was judged an improvement on the voluntary SMR because it would legally re-enforce the existing code of conduct and bring resources to manage the MNR. Except for scallop fishing, it avoided tackling the difficult issue of fisheries management – commercial or recreational – because of the Government policy requirement for total consensus before it would designate an MNR. This policy, as much as the weak legislative provisions, eventually killed the MNR process.

Lomanotus genei *Limacia clavigera.*
Two thirds of the British sea-slug list has been recorded in the Skomer MNR including species new to Britain and to science.

The consultation negotiations ran for four years. Compromises were made, including dropping some proposed byelaws, and the Skomer MNR was designated in July 1990, just months prior to the NCC being dissolved and the Countryside Council for Wales (CCW) established.

Over two decades later, the on-water public engagement and deterrence patrolling, coupled with onshore outreach and education, have secured the support of most users. Biological monitoring, including valuable volunteer 'citizen science' projects, has recorded real conservation gains, such as the dramatic recovery of the scallop population, the most diverse animal communities in Wales in formerly dredged areas, and an increase in the size of the Reserve's sea-grass bed. These successes were dependent on the expertise and dedicated effort of the MNR's staff, CCW's continued resourcing and staffing of the Reserve, the SWSFC's scallop fishing byelaw and the support of the MNR Advisory Committee which evolved from the former Management Committee.

Not surprisingly, problems remain. Over time it became clear that 'low-impact' shellfish potting was not quite so benign as had been popularly assumed. On Advisory Committee recommendation, a proposal for a 'no take zone' was developed in 2003. The proposal took two years of careful negotiations and would have enabled the fishermen then using the MNR to phase out their effort over ten years, and angling to continue in the most popular area: it was rejected by the SWSFC. Shellfish potting effort then almost doubled in the following three years.

After Skomer, only one further MNR was designated and the MNR provisions became increasingly criticised by the conservation community, academics and environmental lawyers as too weak and ineffective. Unfortunately, in the haste to advocate for stronger marine nature conservation legislation, the achievements of Skomer MNR and the lessons it provided were frequently overlooked.

The Menai Strait was one of the other original sites on NCC's MNR shortlist. Although considerable effort went into seeking support for its designation there were many objections, some to MNRs in principle, and the proposal was quietly forgotten when European Marine Special Areas of Conservation came over the horizon.

European Marine Sites

When the UK regulations implementing the 1992 European Community Habitats and Species Directive and its pan-Europe system of protected sites – the *Natura 2000* series – appeared, they contained special provisions for marine *Natura 2000* sites, grandly titled European Marine Sites (EMS). With brand-new EMS centre stage, MNRs faded from the

collective memory and any aspirations to designate more evaporated.

However, there were ominous similarities between the regulations and the discredited MNR sections of the 1981 WCA. Also, rather than identifying any one organisation as having responsibility for managing EMS, the regulations gave a duty to all relevant public bodies to *"exercise their functions so as to secure … compliance with the requirements of the Habitats Directive"* and enabled them to collaborate to develop a management scheme – if they felt like it. Whilst a collaborative, consensus approach appears attractive, EMS management schemes have gone on to demonstrate the difficulty of obtaining the necessary consensus and commitment to management action.

Scallop size range

Most marine habitats listed for protection in the Directive are large physiographic features, so it appeared to make sense to select few large sites: just five wholly Welsh EMS and two cross-border estuary EMS cover over 70% of the coastline and 36% of territorial sea area (see back cover). The other UK countries selected many, mostly fairly small, sites.

It looks like a lot of protection, and it might be if designation equalled protection; unfortunately it doesn't. The relevant authorities for all except one EMS formed collaborative groups, which developed management schemes for each site. These consensus schemes took a long time to produce and the need to keep every authority engaged resulted in failures to agree on some issues and the omission of some necessary actions. Despite the schemes resulting in good liaison and outreach work it is difficult to identify changes to management resulting in conservation benefit. Known threats remain ineffectively managed; for example, illegal scallop dredging continues and little effort goes into enforcing regulations.

Blaise Bullimore

Scallop (*Pecten maximus*) population density in suitable habitat has increased by over 25 fold since dredging was banned in the MNR.

Widespread discontent about the failures of the MNR process, and of EMS management, fuelled conservation NGO lobbying of government to introduce stronger marine nature conservation legislation throughout the late 1990s and 2000s, which finally reached the statute book in 2009.

Marine Conservation Zones

The 2009 Marine and Coastal Access Act repealed MNR legislation and introduced provisions for Marine Conservation Zones (MCZs): the MNR is dead, long live the MCZ! But the MCZ management model is almost identical to that for EMS, despite its apparent lack of effectiveness. Simply giving public authorities a duty to do their jobs in a way that they think will support, or at least not hinder, achieving conservation objectives is just not good enough.

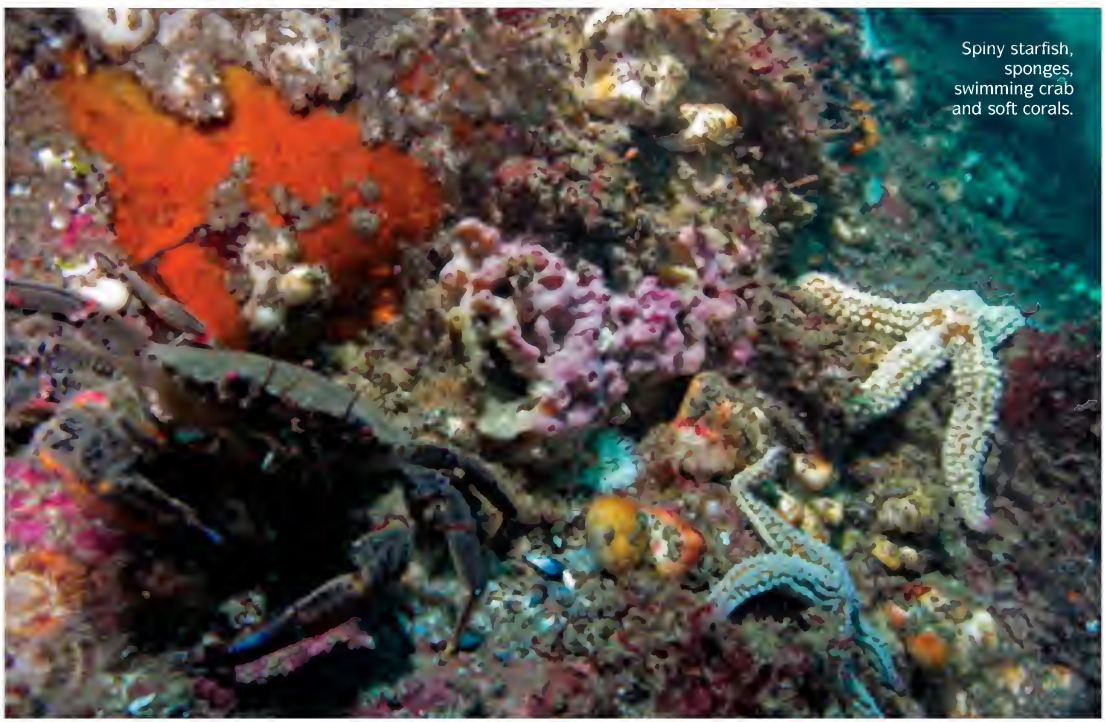
Also, as the primary purposes of Welsh Government's (WG) Fisheries Unit are to support and develop the industry, there is an inherent conflict of interest between fisheries exploitation and conservation goals.

In 2009 WG consulted on 'Protecting Welsh Seas', a draft strategy for Welsh MPAs and their contribution to an ecologically coherent UK network. Having taken advice from CCW, WG stated its intention to use the new powers to create highly protected MCZs (HPMCZs), within which no extraction, deposition or damaging activities would be permitted.

However, by the time a prolonged, complicated and secretive site selection process was completed, WG's rationale for its HPMCZ approach had either been forgotten by the public or had never come to many people's notice at the time. The consultation was so mishandled that it was a master-class in how not to carry one out! The consultation document was inaccessible, ambiguous and misleading. It unnecessarily alarmed many people and seemingly alienated everyone, including those naturally sympathetic to marine conservation. Failures to plan engagement with any interests other than fisheries, or to proactively engage with local communities adjacent to proposed sites, were serious errors of judgement. Legitimate confusion was worsened by misinformation that was repeated by economic self-interests and ideologically opposed protestors, but which went uncorrected by WG, who demonstrated a clear pro-fisheries bias.

Although considerable information had been collected in the 40 years since NERC's 1973 report, the evidence used to make the case for HPMCZs was criticised as insufficient. The contribution of dozens of selfless, conscientious, volunteer Seasearch survey divers was vilified and discounted by objectors. It doesn't matter how much ecological information is collected, it never seems to be sufficient, nor good enough. Yet, the same standards of evidence are not demanded from challengers to MPAs, whose assertions of potential economic losses are accepted without question.

Wales Environment Link mounted vibrant advocacy campaigns for MCZ provisions in the 2009 Act and, later, their application, but in the face of the vitriolic objections to Wales' initial HPMCZ proposals its NGO members – with the notable exception of the Marine Conservation Society – suddenly back-pedalled. Promotion of comprehensive proactive protection was diluted to supporting reactive 'risk-based' management and 'sustainable' harvesting in MCZs. It's sad to see such double standards applied to the sea: would a suggestion to 'sustainably' crop the puffin and shearwater populations on Skomer – using indiscriminate traps that damage habitats and crush sensitive vegetation – not be greeted with horror by these same NGOs?



Spiny starfish, sponges, swimming crab and soft corals.

Blaise Bullimore

Grazing Common or Edible sea urchins (*Echinus esculentus*). Depletion of their predators by fishing can result in population increases which may over-graze habitats

An 'alternative' to HPMCZs published by the fishing industry was widely, though naively, greeted with open arms. Its core recommendation was to adopt almost the exact approach that EMS management has followed for over a decade, but with a twist – 'co-management' by the fishing industry. Whilst fishermen should indeed be involved in marine management, their industry's track record of self-control and compliance with regulation leaves so much to be desired that it does not inspire confidence in co-management.

After a silent period following the consultation, a Task and Finish Group was appointed by the environment minister to "reflect on" the almost 7000 responses to the consultation and, advised by a Stakeholder Focus Group, to "fully explore all the information received, to inform how we move ahead with MCZs". Though outputs from these Groups were not shared widely, what trickled out revealed that, rather than an overwhelming opposition to the initial proposals, 81% of consultation responses supported HPMCZs. Yet, because many of these had been stimulated by environmental NGO campaigns, they seemed to have been considered less valid than objections. Recommendations went to the minister at the end of April. Time will tell what they are and what the minister decides to do, but it's looking like Skomer MNR will be renamed an MCZ and everything else will be scrapped and we'll start again.

A National Assembly for Wales' Environment and Sustainability Committee marine policy inquiry reported in January this year that, four years after the 2009 Act, WG had not delivered on the responsibilities it had been given and that the marine environment in Wales had not been given sufficient priority.

Marine conservation in Wales is struggling. The success and value of the single MNR has been underappreciated almost since the day it was designated, and EMS implementation has been, at best, disappointing. At present the MCZ process seems to have set progress back, not moved it forward. Where will marine conservation in Wales be in five years' time? Comprehensive and effective EMS management and several fully protected and well resourced and managed MCZs, starting with Skomer, would be marvellous, but given the history of false optimism I trust you will forgive me for not planning to hold my breath.

***Blaise Bullimore** was the Skomer MNR's first manager and is now a European Marine Site Officer, consultant and Skomer MNR Honorary Warden and scientific dive team volunteer.*

Acknowledgements
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Gwarchod natur y môr yng Nghymru: gobaith ynteu anobaith?

Nid yw'r frwydr i ennyn sylw'r cyhoedd ac ewyllys da gwleidyddion tuag at warchod natur y môr wedi bod yn hawdd. Mae BLAISE BULLIMORE yn disgrifio'r cynnydd araf sydd wedi'i wneud, y rhan y mae Gwarchodfa Natur Forol Sgomer wedi'i chwarae, a'r dyfodol ansicr sy'n wynebu rheoli cadwraeth y môr.

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Adfer gorgors yn Rhyd-ddu

2013: y gors yn dal dŵr wyneb ar ôl y gwaith hydrolegol
2013: the bog retains surface water after hyrological repair

Ond gwn pwy wyf, os caf innau fryn
A mawndir a phabwyr achraig a llyn.
Syr T.H. Parry-Williams,
Cynefin

Dros y gaeaf, ymgymerwyd â gwaith i adfer ardal o orgors yn Rhyd-ddu, Eryri. Adroddiad gan ***GETHIN DAVIES*** *ar brosiect i adfer Rhyd-ddu i'w ogoniant barddol gynt.*

Cyfeiriodd y bardd enwog Syr T.H.Parry-Williams at fawndir Rhyd Ddu yn un o'i gerddi enwocaf, Cynefin[1]. Ond roedd hanes o dorri mawn, draenio a llosgi ar y gors wedi peryglu'r dirwedd hon.

Erbyn hyn, mae prosiect ar y cyd rhwng Awdurdod Parc Cenedlaethol Eryri (APCE), Cyngor Cefn Gwlad Cymru (CCGC) a thirfeddiannwr preifat, a ariennir gan Gronfa Gwydnwch ac Amrywiaeth Ecosystemau Llywodraeth Cymru, yn adfer y tir. Ei nod yw adfer 33 hectar o orgors a chyforgors sydd wedi ei difrodi yn sgil gweithgaredd torri tyweirch, agor ffosydd a thanau. Mae'r gors ei hun yn gorwedd mewn llecyn o'r enw "Pitt's Head", sef y pwynt uchaf ar Reilffordd Ucheldir Cymru a gwahanfa ddŵr Afon Gwyrfai ac Afon Colwyn, sy'n hawdd i'w gweld o ffordd yr A4085 rhwng Beddgelert a Chaernarfon. Er gwaethaf y difrod a wnaed yn y gorffennol, yn cynnwys cynllun draenio dwys a arweiniodd at agor dros 15km o ddraeniau ar y safle, amcangyfrifir bod dros 700,000 m³ o fawn yn parhau i fod ar y safle ar hyn o bryd. Yn ogystal

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Cors Ffrid Uchaf yn 2009, yn dangos draeniau dwfn a môr o laswellt y gweunydd yn dilyn y naill dân a ôl y llall.
Cors Ffridd Uchaf in 2009, showing deep drainage and the monoculture of purple moor grass *Molinia caerulea* following successive fires.

â hynny, mae sawl rhywogaeth allweddol sy'n angenrheidiol i fawn dyfu yn dal i fod ar y safle, sef rhywogaeth y Sphagnum neu fwsoglau mawn a hynny er gwaethaf y gweithgaredd llosgi a phresenoldeb gormesol glaswellt y bwla *Molinia caerulea*.

Dechreuwyd Prosiect Adfywio Cors Ffridd Uchaf ym mis Medi 2012 pan fu contractwyr lleol yn trwsio terfynau ar y gors ac fe sefydlwyd trefn fonitro sylfaenol ar y safle gan Gyngor Cefn Gwlad Cymru. Yn dilyn hyn, yn ystod hydref 2012 bu swyddogion APCE yn gweithio ochr yn ochr â disgyblion o Ysgol Dyffryn Nantlle yn marcio dros 15km o ffosydd ar y safle yn barod ar gyfer y gwaith.

Clywodd y disgyblion am y modd y mae ecosystemau yn gweithio a hefyd ynghylch y manteision a ddaw i fioamrywiaeth yr ardal yn sgil y prosiect hwn. Bydd adfer y safle yn cynyddu gallu'r mawn i gloi carbon, gwella ansawdd dŵr yn Afon Gwyrfai, a chynorthwyo i arafu llif y dŵr oddi ar y tir yn ystod cyfnodau o law trwm, gan leihau'r perygl o lifogydd.

Ym mis Tachwedd 2012 dechreuodd contractwyr lleol llenwi'r ffosydd drwy ddefnyddio peiriannau cloddio i wthio gwastraff a thyweirch i mewn iddyn nhw. Yna, ar ran ddeheuol y safle, cafodd argaeau mawn eu hadeiladu ar hyd sianeli bas er mwyn dal dŵr a chreu pyllau. Bydd yr argaeau yn sicrhau fod y gors yn parhau i fod yn wlyb ac yn annog tyfiant planhigion fel llafn y bladur *Narthecium ossifragum*, chwys yr haul *Drosera rotundifolia* a mwsoglau Sphagnum i dyfu, yn ogystal â gwella'r cynefin ar gyfer creaduriaid megis gweision y neidr a llyffantod. Wedi i'r gwaith gael ei gwblhau, bydd y safle yn cael ei bori'n ysgafn gan wartheg a defaid o dan gynllun amaeth-amgylcheddol, gan gydnabod y cyfraniad y mae'n ei wneud o ran darparu gwasanaethau lluosog megis gwella ansawdd dŵr, lliniaru effeithiau llifogydd a dal a storio carbon.

Er mwyn hyrwyddo'r prosiect a'i ddibenion, bydd APCE yn cynnal diwrnod gwirfoddoli ar y safle ar y 24ain o Chwefror ar y cyd gyda Chymdeithas Eryri. Bydd gwirfoddolwyr yn cwblhau'r gwaith angenrheidiol i flocio ffosydd drwy ddefnyddio offer llaw a digon o waith caled hen ffasiwn! Yn ogystal â hynny, cynhelir diwrnod agored ar y safle yn ystod haf 2013 i gyd-fynd ag Wythnos Bioamrywiaeth Cymru i hyrwyddo'r gwaith fydd wedi cael ei wneud ac i dynnu sylw at y buddiannau lluosog y gellid eu cael drwy ymarfer dull 'ecosystemau' tuag at reolaeth tir.

Mae'r gwaith sydd wedi ei gyflawni yn Ffridd Uchaf wedi annog perchennog tir cyfagos i wneud gwaith tebyg yn Nrwsycoed Uchaf, sydd hefyd o fewn gwahanfa ddŵr Afon Gwyrfai. Fel yn Ffridd Uchaf, mae'r cynefin hwn wedi dirywio dros y degawdau diwethaf yn sgil agor ffosydd a gorbori'r tir. Yma, bydd 5 ha o orgors yn cael ei hadfer drwy gau ffosydd, creu mannau croesi ar gyfer defaid a gwella terfynau er mwyn rheoli dwysedd y pori. Y gobaith yw y bydd ffermwyr eraill yn gwerthfawrogi'r gostyngiad yn nifer y defaid sy'n marw mewn ffosydd yn ogystal â'r incwm amaeth-amgylcheddol sydd ar gael ar gyfer rheoli gorgorsydd.

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Criw yn adfer y tir, Chwefror 2013 • Restoration work party February 2013

*Mae **Gethin Davies** wedi bod yn Swyddog Ecosystemau a Newid Hinsawdd gydag Awdurdod Parc Cenedlaethol Eryri ers Ebrill 2012, ac roedd yn Swyddog Prosiect ar gyfer y gwaith yn Ffridd Uchaf. Am ragor o wybodaeth ynghylch y prosiect, gallwch gysylltu gyda Gethin ar **g.davies@eryri-npa.gov.uk***

Cyfeiriadau

1. Syr T.H. Parry-Williams, *Cynefin*.

But I know who I am, if I can have a hill
And peat and rush and rock and a lake
Syr T.H. Parry-Williams, Cynefin

Over winter, work has been carried out to restore an area of blanket bog in Rhyd-ddu, Snowdonia. GETHIN DAVIES reports on a project to restore Rhyd-ddu to its poetic former glory.

A full translation of this article is available on request, or via our website ***www.naturcymru.org.uk***

Mandy Marsh

Llafn y Bladur *Narthecium ossifragum* Bog Asphodel

Sue Scott

Sea stars and the Sea Empress

a tale of two cushion stars in south-west Wales

Conservation of the marine environment ultimately depends more on meticulous observation of small creatures at the base of food chains than on endless research into headline grabbing sea-birds and cetaceans. In one example of painstaking research over more than four decades, the rewards have included the discovery of a new species of cushion star in British waters, and, following a devastating oil pollution incident, an extraordinary story of survival and reversed fortunes, as ROBIN CRUMP reports.

The two British species of *Asterina*

When I first came to work at Orielton Field Centre in 1970 I had recently finished a PhD in New Zealand on a large asterinid sea star *Patiriella regularis*. I was keen to continue to research cushion stars in the field and decided to have a look at *Asterina gibbosa* (Pennant), which is not uncommon on the lower shore throughout Wales. I was told by my boss Eric Cowell that there was a large population (thousands, he said) at West Angle Bay. I enlisted the help of a friend, Dr. Roland Emson of Kings College, and together we spent the next seven years working on this large population of *Asterina gibbosa*.

Our joint research showed that *A. gibbosa* is a medium size (up to 40mm diameter arm tip to arm tip) cushion star, which is male for the first two years, becomes hermaphrodite with ripe eggs and sperm in the third year and female in the fourth at about 20mm in diameter. It lays heavy yolked benthic eggs in patches of up to a thousand in each egg mass on the underside of stones. These eggs normally metamorphose in 3-4 weeks in June, producing mobile sea stars approximately 0.75 mm in diameter. The eggs are subject to severe predation by a variety of annelid worms, prawns and small crabs. The cushion stars are usually

found on the underside of stones during the day but may come out to feed on the tops at night. Small numbers are found scavenging on dead crabs and other carrion, but the principal method of feeding is to evert the stomach lobes over a film of bacteria, diatoms and detritus on the surface of the rock[1].

Robin Crump

Asterina phylactica with juveniles

Asterina gibbosa ranges in colour from green to khaki to bright orange. During the course of our studies we kept finding a small brown variety of *A. gibbosa* with a distinctive colour pattern of a bright orange brown sub-star on a dark green ground. This colour form never grew larger than 15mm and further research showed that these animals were regularly found sitting over the egg mass for three weeks in June. Eventually newly metamorphosed juveniles crawled out from under the mother, a protandrous (male first) hermaphrodite at 10mm or 2 years old, and dispersed. It appeared that most of the two year olds failed to survive another winter. After much discussion and even heated argument we were forced to describe the small brown form as a new species viz: *Asterina phylactica*[2].

There are very few morphological differences other than colour and a pair of small spines under the chin, but *Asterina gibbosa* and *Asterina phylactica* have significantly different life strategies. In addition to the fact that *A. phylactica* broods the eggs and developing juveniles whereas *A. gibbosa* does not, *A. phylactica* matures earlier, laying eggs first when only one year old (5mm diameter) against four years and 20mm in *A. gibbosa*. *Asterina phylactica* has a much shorter life span (2-3 years) where as *A. gibbosa* may live to seven years or more[3]. Further studies using gel electrophoresis and DNA analysis have confirmed the specific status of *Asterina phylactica*.

Oil pollution

On the evening of February 1996 the rock pools of West Angle were inundated with oil from the Sea Empress oil tanker. Over the next few days the pools were repeatedly oiled and a specialist team was called in to attempt to remove as much of the oil as possible in order to save the sea stars at the type locality of *A. phylactica*. At that time the species was thought to be very rare with only six known localities in Britain (e.g. Langerstone Point in Devon). A thorough search revealed only one or two *A. phylactica*, although adult *A. gibbosa* were common.

A further extensive search of the pools in June 1996 showed that the majority of the 250 *Asterina phylactica* present before the spill had been wiped out, with only 10 remaining. By contrast the adult *A. gibbosa* (15mm plus) had not only survived but were

Paul Kay

The *Sea Empress* aground in 1996, and the subsequent oil spill

Robin Crump

Asterina gibbosa with egg mass

laying eggs under rocks that still showed signs of oil. We feared that *A. phylactica* would become extinct at the type locality and asked permission to introduce animals from Devon to replenish the stock, but this was refused.

In June 1997 I found five out of ten *A. phylactica* individually brooding egg masses several metres apart and decided to see if the species was capable of self-fertilisation. Accordingly I brought one brooding animal on its rock into the lab at Orielton and within three weeks the egg mass had metamorphosed successfully. After two weeks of feeding the juveniles on the algae growing on the glass of the aquarium I was able to return the adult and 50 juveniles to the pools at West Angle.

Nonetheless, prospects for the survival of *A. phylactica* at West Angle looked bleak. The absence of almost all the predators on eggs due to the oil spill meant that the vast majority of the eggs of *A. gibbosa* had survived to metamorphosis, and a population explosion of the species ensued. By October 1997 there were huge numbers of tiny, white (3-4 mm diameter) juvenile *A. gibbosa* found throughout the pools. By June 1988 (see Fig. 1) the population had risen to 655 animals as against only 21 *Asterina phylactica*.

Unexpected recovery

Despite this intense competition for food and space *A. phylactica* continued to hold its own and began the fight back. By June 2000 *Asterina phylactica* numbers had risen to 107, with 80 animals in the first year class, and only 222 *Asterina gibbosa* were found. The numbers of *A. gibbosa* remained much the same over the next four years, but by June 2004 there had been an excellent recruitment of *A. phylactica* with over 600 found in the survey. While both species had good and bad years over the next eight years, the numbers of *A. phylactica* greatly exceeded those of *A. gibbosa* and, by June 2012, numbers of *A. gibbosa* had shrunk to just over 100 individuals while 1345 *A. phylactica* were measured. It is probable that all the animals are descended from the 10 survivors of the spill, which represents a very limited gene pool. Nevertheless, one can say that *A. phylactica* has more than recovered and now appears to be out-competing *A. gibbosa* to a considerable degree.

It was always difficult to understand how two such similar sympatric species could live under the same stones in the same mid-shore pools, exploiting exactly the same microphagous feeding habit, without competing with each other for food and space. Prior to the oil spill, for 20 years the ratio of the numbers of the two species was of the order 5:1 in favour of *A. gibbosa*. Now the situation is reversed with a better than 10:1 ratio in favour of *A. phylactica*.

It appears that *A. phylactica* is now out-competing

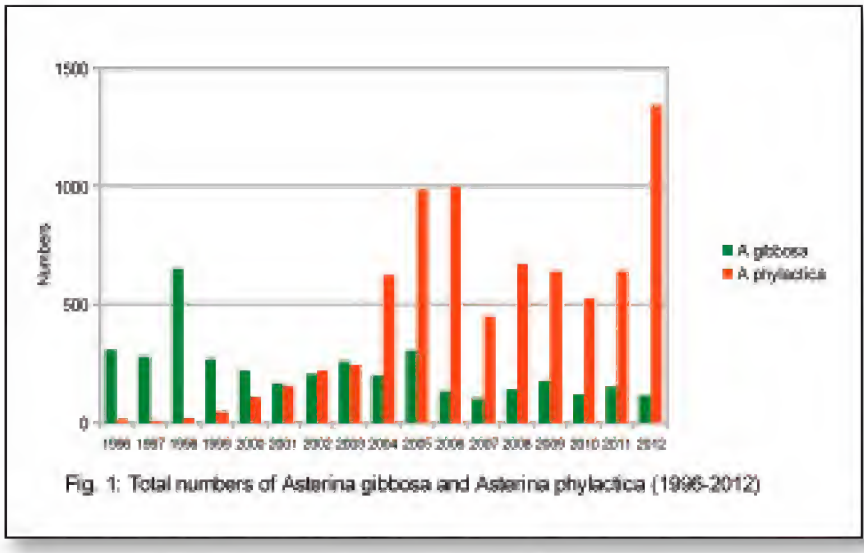

Fig. 1: Total numbers of Asterina gibbosa and Asterina phylactica (1998-2012)

Robin Crump

Size categories of *Asterina gibbosa*

A. gibbosa in this mid-shore rock pool habitat. It is possible that this competition may include a rather unusual form of conflict. *A. gibbosa* has been observed to cover, eat and digest individually brooding *A. phylactica*. By the same token *A. phylactica* is attracted to the egg masses of *A. gibbosa* and has been observed to prey on them. It may be that at the present time the huge numbers of *A. phylactica* are pushing *A. gibbosa* to extinction in the pools by predating the egg masses. Prior to the oil spill, egg masses of *A. gibbosa* were common in June, occurring on every large stone. In 2012 only two intact egg masses were found. By contrast, there were close to a hundred groups of five or more brooding *A. phylactica* sitting over egg masses at that time. I know of no other example of two invertebrate species competing by eating each other or their eggs, though it may happen in birds.

Interestingly, single species populations of *A. gibbosa* and *A. phylactica* are the norm. *A. gibbosa* is normally found on the lower shore under stones exposed at low tide. On the left hand side of West Angle Bay there are many shallow, mid-shore pools with a large population of *A. gibbosa* and not a single *A. phylactica* has been found there. Conversely the large systems of rock pools at Carrigathorna (Eire), Langerstone Point (Devon), and the Worms Head, near Swansea, support pure populations of *A. phylactica* with no *A. gibbosa* present. Indications are that *A. phylactica* is a Mediterranean species close to its northernmost limit in Wales. It may be that the higher temperatures in the rock pools in summer, as a result of climate change, may be contributing to the success of the species in Wales.

***Robin Crump** worked for over 30 years as Director of the Field Studies Council Centre at Orielton, Pembrokeshire, teaching marine biology. Since retiring in 2003 he has continued to work on rocky shore surveys and cushion stars in particular. His other interests include bats, supralittoral lichens and marine conservation.*

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The one that got away:

what influences recreational crabbing success?

Common shore crab *Carcinus maenas* Cranc Gwyrdd

Research is often conducted far from public scrutiny, and it is unusual for the public to contribute. A piece of research into crabbing, which could have implications for our understanding of the impact of baits on the marine environment generally, has had people at its centre, as PIPPA MOORE explains.

What do you remember from your seaside holidays as a child? A lot of people remember the annual 'crabbing' competition, which pitted generations and family friends against each other to see who was the champion crab-fisher. But what dictates a crabber's success? Some argue it is the fishing gear, others that it is the bait recipe that has been passed down for generations. During the summer of 2012 researchers and students from the Institute of Biological, Environmental and Rural Sciences (IBERS), Aberystwyth University, embarked on a project to try to understand a little more about what makes a successful recreational crab-fisher, while also determining how regularly crabs were re-caught and how many crabs were influenced by this activity.

Recreational crab fishing continues to be a popular seaside pastime for holiday-makers throughout Britain. Go down to any harbour or seawall on a sunny (or even rainy) summer's day and you will see children and adults peering into the murky depths while jigging a piece of bacon (or some other favoured bait) in the hope of tempting a crab to grab onto the line.

Liz Humphreys

Recreational crab fishers along Aberaeron Harbour

A successful bite leads to squeals of excitement as the crab is reeled into the bucket, or groans of despair as it drops off tantalisingly close to being caught.

This may appear to be a whimsical pastime, but estimates suggest that leisure and recreation bring approximately £11.77 billion to the UK economy each year. Although only a very small fraction of this is likely to be directly related to recreational crab fishing, tourists spend money on crabbing equipment, bait, ice-creams and other refreshments. I have noticed a correlation between crabbing activities and pubs, but that may be my own predilections coming through. Recreational crabbing makes a valuable contribution to local coastal economies.

Baits and fishing gear

As a marine scientist watching this pastime, a few questions jump into my head. Which techniques and baits are most successful, if any? The bait used is brought from the shop or home and often discarded into the water to feed crabs and other marine animals at the end of the crabbing session. What does this additional food subsidy mean in terms of the numbers of crabs in the environment, and for the flow of energy through marine food webs?

In order to address some of these questions we enlisted recreational crabbers and turned them into citizen scientists. Using this approach not only meant that we could collect data without being physically present, via the use of questionnaires, but also that we could educate members of the public, and in particular children, on interesting crabby facts and how to care for crabs once they had been caught.

Our research project took place in Aberaeron, a picturesque coastal village in mid-Wales about 20km south of Aberystwyth. Aberaeron supports a large recreational crab fishery with up to 100 people sitting on the harbour wall at any one time during a sunny summer's day, with a few intrepid people spotted even on wet, windy days, dropping their crab lines into the water. The most commonly caught species in this harbour is the Common Shore crab *Carcinus maenas*, which is a robust species able to tolerate the wide changes in salinity and temperature that a tidal harbour like Aberaeron, with strong freshwater influences, is subject to. *Carcinus maenas* grows to about 8cm and, like all crabs, only grows by moulting its old shell to reveal a soft shell which, once hardened, may be a third larger than its previous shell. These soft-shelled crabs are often called 'peelers' and are commonly used as bait for catching a wide range of fish species.

In order to determine the size of the Aberaeron crab population, and to see how regularly crabs were caught, we tagged crabs caught in modified prawn pots, using small coloured, numbered tags that are more traditionally used by apiarists to mark their queen bees. In total we caught and tagged nearly 400 common shore crabs over a period of two months. We recorded information regarding crab

Liz Humphreys

Tagged crab, part of the mark and recapture study

sex, size and colour-morph before returning all tagged crabs back to the harbour. Of the 400 crabs tagged, only 42 were re-caught during the whole summer and of those only four were caught more than once. Based on trials, we know that the tags were unlikely to have fallen off and that the crabs should have all been in an inter-moult period, so tags were unlikely to have been lost as a consequence of moulting. This suggests that a staggering 15,000 crabs utilized Aberaeron harbour at some point during the course of the study. Given the amount of freshwater that flows into the harbour it is likely that crabs migrate in and out with the tide, and therefore the harbour is unlikely to hold 15,000 crabs at any one time. It is more likely that individual crabs migrate in, depending on a range of physical and biological conditions.

Citizen scientists

Our citizen scientists (nearly 100 of them) caught over 1,800 crabs, which is perhaps 10% of the total crabs caught by all recreational crabbers in Aberaeron. An average of 22 crabs were caught per person during the 1.5 hours that most individuals spent fishing. Talking to our participants, we found that finding the best bait was of keen interest. Some people went to great lengths to ensure that they maximized their crab-catching potential. For example, one family swore that the most effective bait was smoked (not green) bacon that had been seared on each side for two seconds. Bacon and fresh mackerel were by far and away the most popular baits, with dried mackerel coming a distant third. But interestingly, across the ten bait items used by participants, we found no significant difference in the catch per unit effort (CPUE), with all bait types just as likely to catch a similar number of crabs. A disappointing result for those crabbers who have sworn by secret bait recipes for years, but perhaps unsurprising for those who know something

Liz Humphreys

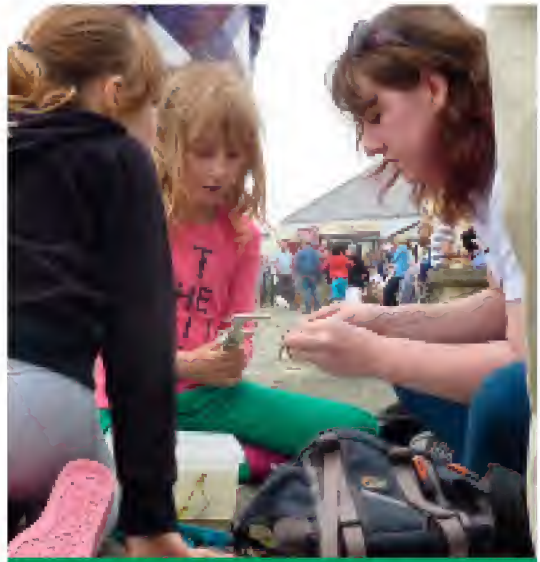
Pippa at the Cardigan Bay Seafood Festival, talking about the project and the biology and ecology of crabs

about the diet of crabs! Crabs are known to have a varied diet and consume whatever they come across, be that plant, animal, bacon or sausage.

The most popular items of fishing gear were hooks (with one or two hooks), small bait bags that the crabs could cling to, drop nets, and small plastic boxes that have a similar appearance to traditional crab creels. Top of the list were the small bait bags, followed by the single hook and the drop net. Here we found fishing gear type did have a significant effect on the number of crabs caught, with CPUE being much higher for the drop net (mean CPUE 14 crabs) followed by the small net bag (mean CPUE 4.2 crabs) and plastic box (mean CPUE 4 crabs). So bait may not influence the number of crabs caught, but the type of fishing gear does – a finding that perhaps shatters the illusions of many a recreational crab fisher.

We still have questions to ask and hope to do this over the next few years. These include what happens to bait which enters the marine environment, and whether it is incorporated into higher trophic levels; and whether harbours where recreational crabbing takes place support more crabs than those where this bait subsidy does not occur. These might seem like esoteric questions, but commercial pot fisheries all over the world use bait, and if it is a significant food subsidy for crabs in a coastal holiday town it may also be important further out to sea where commercial fishers pot. If bait is an important food subsidy then we need to include this within spatial management plans that policymakers develop to ensure fisheries remain sustainable.

The best part of this whole project was interacting with the citizen scientists, who were primarily children, and filling them with a passion for the marine environment and seeing them develop an understanding of the need to conserve our natural resources and treat animals with care. These are some of the simple messages which they were quick to take on board. Crabs, and particularly *C. maenas*, may be a hardy species but, like all organisms, they should be treated with care and respect. When picking crabs up, hold them at the corners of the anterior (head) end of their carapace (shell) and you will never be nipped by the chelae (claws). Also make sure you replace the water in the buckets regularly, as the water warms up quickly, making it stressful for the crabs. Make sure you don't place too many crabs into buckets, or they will fight, leading to the loss of legs and claws as well reducing oxygen in the water. Place some seaweed in the bucket, to give your crabs somewhere to hide. I look forward to seeing more people out crabbing this summer.



Liz Humphreys

The next generation of marine scientists helping to collect size data from crabs they have caught

Dr Pippa Moore *is Lecturer in Aquatic Biology, Aberystwyth University.*

Acknowledgments: I would to like to thank all the participants who helped with this project. Without you we would not have been able to do this research.

Yr un a redodd i ffwrdd: beth sy'n dylanwadu ar lwyddiant hel crancod?

Yn aml cynhelir ymchwil ymhell o lygad y cyhoedd, ac mae'n anarferol i'r cyhoedd gyfrannu. Ond mae darn o ymchwil ar hel crancod, a allai helpu ein dealltwriaeth o effeithiau abwydod ar ein hamgylchedd morol yn gyffredinol, wedi bod â phobl yn ganolog iddo.

'I carry your heart with me'
Natur Cymru *writing competition runner up.*

Between two islands by Guy Manning (the 'twitcher'!)

Day one
Things not to take on a trip to Caldey Island:
1. Lip gloss.
2. Self.

Things wish had taken on a trip to Caldey Island:
1. Wine.

I am recently married so when my husband suggested a romantic get away, an island inhabited (excuse the pun) by monks didn't immediately spring to mind. I am no naturist. In fact I'm not even sure if that means someone who loves nature or a person who likes to run around with no clothes on. Since I fit into neither category I shan't look up its definition.

When the other half, a confirmed 'twitcher' (I'm not comfortable saying this word) and I were told that the first person you meet on the island is yourself, I have to admit that I wasn't sure I liked myself enough to have this particular conversation.

"Hello Self. What are you doing on an island looking at, um, nature?"
"Hello to you too Self. I don't know."

Crossing Caldey Sound was treacherous (others say 'calm') and we were met by a monk. A real monk. He delivered us to a converted schoolhouse worthy of gingerbread tales, and remarked upon the weather, "As long as you have sunshine in your heart, that's all you can wish for."

I stared morbidly at gathering clouds.

Day two
The path around the island forms a figure eight. I zip around it so many times I start to feel like a Scalextric car.

Day three
The twitcher is my guide to:
The ethereal light as we walk from shadowed woodland.
I have no mobile phone signal.
Sherbert lemon Primroses in glades.
Not even if I hold it way above my head.
The coconut scent of gorse. The drifting thrift.
I may as well be living in the eighties.

Time moves on though it seems to have no effect here, things swirl around the island merely ruffling

its surface. Clouds scud, settle, make pictures like that game you used to play when you were kids. We play it now. Rabbit, dubious cloud usage. Sheep, too obvious. Dragon breathing fire, hiraeth. A steam train puffing clouds small, smaller, smallest into the distant world's end. We sit on a bench overlooking John Paul Jones bay – he was a pirate not a member of The Beatles – swinging feet on dangling legs, looking, watching, gazing and with nothing else to do you can't help but start to notice things. As much as I scold myself, chide, reprimand, tease myself, distrust myself, eventually I run out of excuses and have to give in to the noticing.

Day four
Tenby looks like a toy town across the water. All the stresses seem to be so small I could squash them between my forefinger and thumb. Smaller than the tiny oil-green beetle that has landed on my leg.

Day four – night
Now I understand the word dark. There is nothing. Nothing except the moon riding too high to shed its spectral light upon us midnight wanderers, and the solemn grace of stars domed in their thousands. Into the quiet, the reminder of bells, knelling the island's intentions.

Day five – morning
Something has happened to me. I have been ensorcelled, lulled by the island's sweet susurration. Some peri or sprite has squeezed 'love-in-idleness' into my eyes and I am seeing differently. A sea-change has occurred.

The beach, peach, tangerine, untouched like a moonscape or a desert. Guillemots float on turquoise undulations in Red Berry bay. Pterodactyl Cormorants streak the waves close to their shadows till rest comes with rock perch and a shaking sparkle of wings. Ducks, like collared priests, give up their waddle for flight. Bladderwrack like shredded bubble wrap, other seaweed – russet through to emerald. The smell of clean as the sun catches the water in glitter pools. A billion fragments of lilacs, indigo, violets, mauves shattered, scattered by the rocks. A crow flies vertically to let a mussel fall – nature both inventive and cruel. Shadows grow blue in each pink print waiting to be rubbed away from washing machine sands.

I glimpse a seal. A real seal. A monk and a seal in one holiday.

Afternoon
Once you let the quiet in the noise begins in earnest.

A raven's ominous croaking grunt, a pheasant makes its escape in shrill coughs, kittiwakes clack their cacophony. Water chuckles over pebbles, tree-tickle whispers at your ear, lilting breeze shushes. The drone of a bumblebee zagging to hide in a purple-blue flower, shyer than most in its ghostlike fragility, equally shy in name. White horses crash sometimes drowning the teenage squabble-peep of red-beaked oystercatchers. Seagulls wail and warn from holes in cliffs, appearing for all the world like holidaymakers on balconies, as the sun begins to drop its thirsty orange glow into the horizon. Blackbirds flap and fuss their last as we wend our drowsy limbs to a very early bed.

Day six
The weather changes fast beneath this expanse of sky. If you had told me that I would allow nature to support my inherent birthright in the form of frizzy triangular hair I would have shaken my straighteners at you. And yet I stand fascinated by the diamond drips of rain making their sparkling descent from a shifting chandelier sky. The fairies here have collected crystals for their cobweb hammocks amongst thick grasses. Spiders spin repairing, bustling, gossiping like an old maid's knitting club. The mist which comes in curtains is a kiss on a face free of foundation.

Our last morning. I am up at a time I had previously believed mythical. A robin, perhaps used through ancestry to little titbits being left by schoolchildren, hops the yard. Wrens like daytime bats flit, taking a keen eye to keep track of their pom-pom path. Jackdaws like suited gentlemen take the morning air, test out the earth anew in sideways steps. A daisy still sleeps curled in cerise edges. Dunes brushed, ready for another day of squall and sift, sport olive greens, wheat colours, parched corns. Jigsaws of sea-spun glass glitter and turn.

As the boat slaps the morning awake the island recedes, blanketing itself in fog, and though I can no longer see it I carry it with me, ' I carry it in my… '

Eloise Williams

All photos: Matt Sutton and Vicky Swann

Harvest time again:

Seed-collection and meadow restoration in Pembrokeshire

No habitat is more insecure and dependent or agriculture, or more stunningly rich in plant and insect life, than the traditional hay meadow. Surveys and conservation efforts have saved a few, but even these have to earn their keep. MATT SUTTON and VICKY SWANN describe their own experiences trying to reap a variety of meadow harvests.

One needs faith not to see traditional wild-flower meadows as an anachronism, about to be swept away by a tide of concern for food security, energy production or new housing needs. The near total loss of such meadows during the last century is well-documented, and conservation efforts have belatedly focussed on the few remaining examples of note. Following a long and detailed programme of survey across Wales, some are now designated as Sites of Special Scientific Interest (SSSI).

Our own farm in south Pembrokeshire comprises 87 acres of land which has escaped modern agricultural management. There are several flower-rich meadows and pastures at the heart of the farm (if we're getting technical, they're classed as MG5a and MG5c in NVC speak). These run into purple moor-grass and rush pastures wherever springs come up or clay impedes the drainage. A surrounding tangle of well established scrub and woodland provides good shelter, and a reminder of one fate awaiting such meadows should farming or conservation management be abandoned.

One of us, Matt, initially became involved with the site as a grassland surveyor with the Countryside Council for Wales (CCW), then as a conservation officer after it was designated as Wyndrush Pastures SSSI in 1999. He somehow ended up as the owner in 2005, and began to farm for the first time. The transition from advising on management to carrying it out unsurprisingly led him to rethink a few things. Upon leaving CCW, one key question facing him was economic reality.

Does conservation management pay the mortgage?

Management agreements are generally available to owners of SSSIs, and these provide a financial incentive to carry out conservation management. Owners of non-designated grassland habitats often receive similar grant money through Tir Gofal or Glastir for carrying out a programme of management, albeit one less tailored to the individual circumstances of the farm. Such payments can be a significant income stream to small farms such as ours, and together with other farm support measures such as the Single Farm Payment and Organic Farming Scheme, have kept extensive management alive in recent years. The costs and ethics of such support mechanisms are increasingly being called into question, and the anticipated reductions in payments due to CAP reform are now being felt. By limiting the agricultural inputs to a farm system, these schemes inevitably limit the agricultural outputs. Conventional farmers are often happy to leave unimproved meadows behind.

We have followed a conservation policy of no lime, fertilisers or field drainage for the last seven years, coupled to a late hay cut and organic cattle grazing. Whilst doing so we have witnessed the grass-dominated parts of the fields becoming rich in orchids and other meadow flowers, but we have also seen yellow rattle sometimes becoming aggressively dominant, and our soft rush management has had to increase in the wake of several cool, wet summers. We have also charted the decline in hay production and the reduction in the number of calves or finished beef cattle which we can rear and sell. Stephen and Anne Coker tell us that their spectacularly orchid-rich fields at Mountain Meadows SSSI in north Pembrokeshire can no longer really be called meadows, as their productivity has been so severely depleted that it's not often worth them trying to take a hay cut.

Keeping grazing animals is considered integral to good meadow management, but on a small scale this can be a financial liability as well as a large time commitment. Cattle reared exclusively on botanically-rich pasture and hay mature slowly, and although the finished animal can provide high quality, exceptionally flavoured beef, this is not rewarded by the conventional cattle trade. In common with several other SSSI owners in the county, we take some of our animals right the way through from calving to butchering and sell boxes of 'conservation-grade' organic meat directly to customers. By doing this, we might cover our costs and eat well, but as cattle farmers will tell you, it's a numbers game if you want to make money.

Diversity and diversification

A field of rye-grass is there to produce just one crop – silage for dairy or meat production. Our meadows are now producing three harvests, as well as a host of other benefits which go beyond commercial products.

Our first is gathered in by the honey bees from the dozen or so hives in our apiary – a fine crop of honey from all the nectar plants in and around the meadows. From the first dandelions of the spring, to the knapweed in late summer and all the clovers and trefoils between, the visits that the bees make to these plants are responsible for our favourite harvest of the year. We were told by one conservation charity

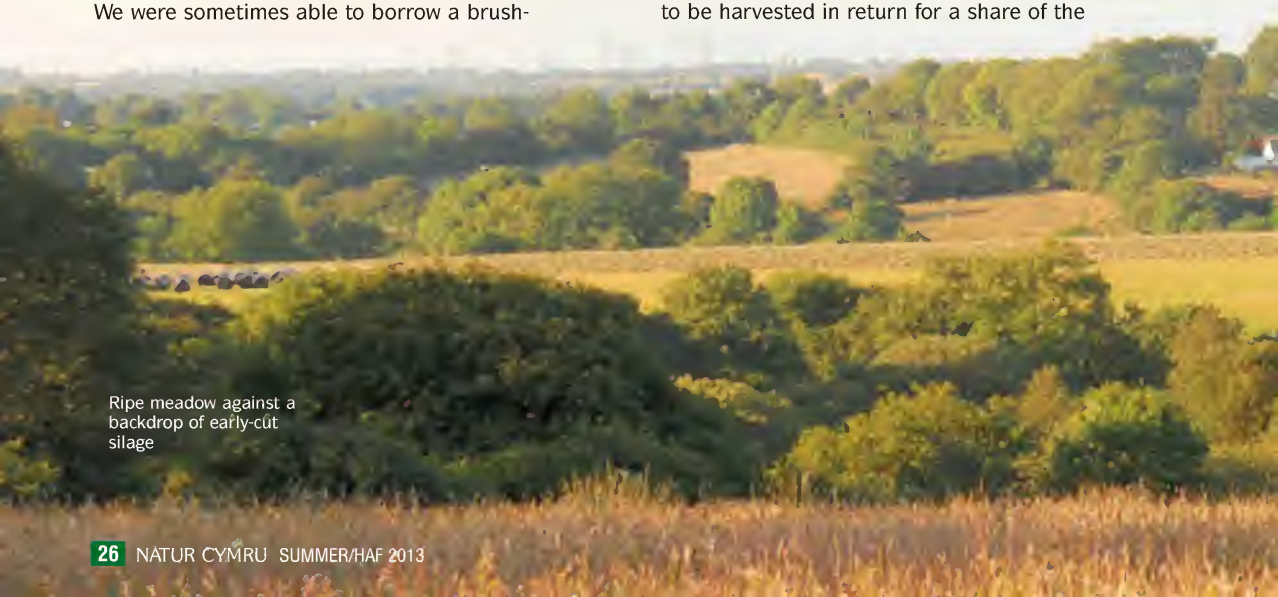
The Logic brush-harvester in action

that beekeeping is incompatible with bumblebee conservation, as the honey bees take too much nectar away from their wild cousins. Here, we have significant numbers of several bumblebees, and the rare shrill carder bee is still in evidence later in the summer, visiting Hedge Woundwort, Knapweed or Devil's-bit Scabious. Perhaps a more significant threat across much of the countryside is the loss of the diverse forage opportunities needed to sustain both hives and bumblebee nests through the year. Meadow restoration projects, even on a small-scale, can make a contribution here.

Our second harvest has been a fickle one, but may represent our most viable enterprise in the coming years. For the last three summers, we have been harvesting ripe hay meadow seed for sale to individuals and organisations wishing to establish new meadows or enhance existing ones. Initially, we collected seed of Yellow Rattle by hand, as this semi-parasitic species weakens grass growth and so is particularly useful in meadow restoration projects. We were sometimes able to borrow a brush-harvester – a machine which is towed through a well-ripened meadow in late July or August. This has a series of rotating bristles, which brush dry seed into a hopper. The contents of the hopper are emptied on to sheets and air-dried. Until last year, however, we weren't legally able to sell any brush-harvested seed. The commercial distribution of any seed mix which potentially contained seeds of 'protected' fodder plants such as clovers and trefoils was deemed illegal under the EU Seed Directive. Fortunately, the Welsh Government passed the Seed Marketing (Wales) Regulations 2012, which now allows the marketing of directly harvested 'preservation mixtures'. There are various requirements for registration, labelling and reporting which inevitably introduce a bureaucratic dimension to the operation, but we've also noted a willingness amongst Welsh Government staff to be pragmatic in their interpretation of the rules.

A mobile harvesting service

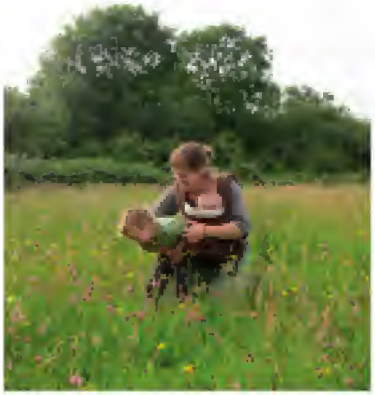
With the assistance of the Welsh Government's Sustainable Development Fund (administered by the Pembrokeshire Coast National Park Authority), we've recently been able to buy our own brush-harvester together with a trailer to enable us to provide a mobile harvesting service. We've also bought a hand-held harvester, which uses a brush-cutter design with a specially modified collecting head to pluck seed from the heads of various species. With several meadow owners in west Wales willing to allow seed to be harvested in return for a share of the



Ripe meadow against a backdrop of early-cut silage

proceeds, we will now be able to supply more meadow restoration projects with selectively matched seed. Our biggest challenge now will be working around weather and hay-making windows.

With our seed spread out to dry on racks in the barn, our attention turns to the third meadow harvest. Delaying the hay cut until August introduces an additional element of risk, as shortening days and dew-laden mornings can often mean that an extra day or two are needed for the hay to dry. Some plants such as ribwort plantain hold their moisture particularly well. A run of four or five good days can be a bit of a tall order, and on one or two occasions we've had to get contractors in to bale and wrap the crop as haylage instead. Hay or haylage, it's always a relief to get the crop off the field ready to keep our animals fed for at least part of the winter. It's not time to put our feet up yet though, as our harvested seed needs to be sieved through a series of meshes to remove as much stalk and chaff as possible, then weighed, bagged and labelled. As well as selling the seed, we've been getting involved with work on the ground for owners who'd like assistance with site preparation and seed sowing. A crawler tractor with flail-mower collector has proved useful in 'scalping' thick grass-dominated fields, and simultaneously compacting the seed sown in front of the tracks. All such work needs to be completed as early in the autumn as possible, as most meadow plant seeds germinate over the course of the winter.



The acid test will be whether we can pay the mortgage by working with other meadow owners and purchasers of seed to increase the resource of this unique but threatened habitat. We hope so, as we are trying to build an ethical business which works to the special qualities of our particular farm. In time perhaps new meadows will be created which in turn provide a range of different harvests, including seeds, to keep meadows alive in the landscape for future generations.

Matt Sutton *spent several years surveying the grasslands of west Wales with CCW, then a few more working with landowners to conserve them. Before moving to Pembrokeshire,* ***Vicky Swann*** *carried out brown hare surveys for the North Wales Wildlife Trust. As well as looking after their farm and harvesting seed, Matt and Vicky run an ecological consultancy specialising in vegetation survey and habitat restoration. They can be contacted via* ***wyndrushwild.co.uk***

Amser y cynhaeaf eto: casglu hadau ac adfer dolydd yn Sir Benfro

Nid oes unrhyw gynefin yn fwy ansicr a dibynnol ar amaethyddiaeth, neu'n fwy cyfoethog mewn bywyd planhigion a phryfed, na'r cae gwair traddodiadol. Mae arolygon ac ymdrechion cadwraeth wedi arbed ychydig ohonynt, ond mae'n rhaid i'r rheiny hyd yn oed dalu am eu lle. Matt Sutton a Vicky Swann sy'n disgrifio'u profiadau nhw o geisio medi pob math o gynaeafau gwair.

Lesley Till

Observing a Grey Heron - *herons and egrets at large*

It is infinitely worthwhile when we take the time to observe nature. ***LINDA AULD*** *describes the scene at a field pond when a Grey Heron pays a visit, intent on securing a meal, and discusses the other members of the heron family which may be encountered in the Welsh countryside.*

The heron had been playing statues in and around the pond in our field for the last few days. Sometimes it waited in the shallow edges of the island in the middle and other times it stood rigid at the pond edge. The morning sun showed up the white throat and pointed yellow beak. Black streaks on the forehead and brush strokes on the breast stood out against the grey slate base colour.

It was an adult in prime condition. A prehistoric-looking primeval creature, it was a clear reminder of the links between birds and their dinosaur ancestors. The large grey body balanced on the long, reed-like legs as it stood still. Only the wispy black head crest and primary feather tips moved as they ruffled in the wind. I watched through the binoculars, as still as I could, until my arms ached. I too waited for a movement, as if I were watching for a Covent Garden street performer to flex a muscle and give away the pretence. Facing the westerly wind coming from the coast, with water up to the top of its legs, the heron's black shadow spread across the pond-weed surface.

The horse grazing a few metres away didn't disturb the heron, but I

knew the birds on the bird table would fly up if I moved, and that alarm would make the heron take off. Tall and upright, on two legs and with its tail down, it looked human. Perhaps that's why the heron family fascinates us.

Herons and egrets

Others in the family include the Little Egret, Great White Egret, Cattle Egret and Green Heron. The Little Egret is now relatively common, while the Great White Egret is a more occasional visitor. Little Egrets have also landed on our field. Pure white against the mud, they look exotic, with their long fine head-plumes hanging down the back of their necks. People in the 19th and early 20th centuries found these plumes so attractive that the hat trade almost wiped out the birds. The Little Egret became an iconic symbol of preservation in 1889 when concern about the killing led to the formation of the RSPB.

Places to see herons include Aber Ogwen and Conwy RSPB reserve in North Wales. There's a well established Grey Heron colony beside a main road near Pwllheli town centre. They are used to people watching them there and are easy to see nesting in the trees in early spring when the males and females greet each other with a courtship ritual every time they return to the nest. There's also a heronry beside the estuary at Ynys-hir, where Grey Herons have been nesting for decades.

Nesting in colonies in these traditional sites makes nest counting easier and the British Trust for Ornithology (BTO) collects information annually in a Heronries Census. The Grey Heron is the main species observed, but the census also covers the Little Egret and rarer Cattle Egret, which nested for the first time in the UK in 2008.The Cattle Egret at 50cm high is smaller than the Little Egret at 60cm and the Great White Egret at 95cm, and has a distinctive yellow bill. It also has greyish yellow legs, while the Little and Great White Egrets have black legs. The Great White Egret is about the same height as the Grey Heron, but the Grey Heron is wider. The Green Heron is only 44cm in height so is smaller than the other three. It has a green cap, reddish brown neck and breast, greyish purple sheen to its back and wings and short yellow legs. It is normally

Mandy Marsh

Grey heron *Ardea cinerea*

only seen in the UK when blown off course, but could become more common as the climate changes. We may see more of the Little Egret, Cattle Egret and Green Heron in the UK if winters here become milder.

Herons are predators at the top of the food chain and their presence shows a healthy environment. Opportunistic and adaptable, they can hunt in most places, from rivers, lakes and marshes to coasts and garden ponds. Fresh, brackish, salt, clear or muddy water – the heron will look for food in all these. It isn't fussy about what it eats either, and will eat other birds, fish, frogs and lizards and also small mammals, such as baby rabbits which it carries to water and drowns before swallowing. Heron necks have a kink in the sixth vertebra (higher than in cormorants and darters, which have the kink in the eighth vertebra). This hinge-like mechanism enables them to lunge and thrust their beaks forward very fast and accurately. Once the prey is caught, the serrated edges of the horny bill sheath make sure there is little chance of escape.

A successful hunt

As the day went on, I watched the heron in our field again and it wasn't bothered when there was a very heavy shower. The grey sky reflected in the water and mirrored the bird's plumage. The grey, black and white colouring breaks up the bird's outline and when

Gaynor Ainscough

Great white egret *Ardea alba* Crëyr mawr

waiting it is camouflaged against the dark and light reflections on the water's surface. Later it crept stealthily forward across the deeper part of the pond. It stalked from odd stances and angles. Had it seen something on the other side? It raised its feet carefully through the deep water, revealing long toes and placing them down slowly without a splash. But no, whatever it was must have gone and the heron stopped and resumed its frozen position.

I tired and put down the binoculars. The heron must have detected the movement and flew up and away. Broad wings were deeply bowed, neck folded up and wings beat heavy and slow. Lowering, with legs dangling ready for touch down, it dropped down neatly in the next field. Disappointed, I went to make a cup of tea.

When I returned it had moved nearer again and was in the ditch at the far side of our field. I could just see its head going back and forth above the top edge as it walked along the inside, working the ditch. It gradually rocked its way along and then walked back to the edge of our pond again. During the course of the day, as the earth orbited round the sun, the light changed. The heron faced the direction it was hunting and positioned itself so its shadow fell behind it, while it stalked with neck outstretched across the water surface. It stopped and took up its statuesque pose again and waited. Minutes passed and my arms began to ache. The earth, with its own atmosphere, was travelling through space at 100,000 kilometres per hour, but this heron and I were motionless.

Then it moved fast across the pond. Had it heard a splash or seen a movement? Its beak stabbed into the water. Up came a large frog. Impaled at the head end, its long hind legs kicked out, as if it was swimming. The breast stroke wouldn't help it now. The wet amphibian's skin shone slimy, gleaming brown and green. The heron dipped it in the water several times, not dropping but rearranging and crushing it, getting a better grip each time. It was turned to the right position ready for swallowing. The frog looked too big to go down the thin neck. Down it went. After a few gulps the legs finally disappeared. It was probably still alive and kicking.

The heron slowly did a stooping, hunched, undertaker's walk back to its former spot, waiting with beak pointing ready to stab, watching and listening for the slightest sign, head slightly tilted as it listened intently. All was still again, as if nothing had happened. The same primordial scene and the same event had taken place in the same way for millions of years, but for this particular frog it was the first and last time this would happen.

Linda Auld *works freelance as a nature writer and a project manager for textbook publishers.*

Edrych ar Grëyr Glas - crehyrod a chrehyrod bach prysur

Nid oes dim yn fwy gwerth chweil na chymryd amser i sylwi ar fyd natur. Mae Linda Auld yn disgrifio'r olygfa mewn pwll cae wrth i grëyr llwyd ddod ar ymweliad, a'i fryd ar ddod o hyd i fwyd, ac yn trafod aelodau eraill o deulu'r crëyr y gellir eu gweld yng nghefn gwlad Cymru.

Manly Marsh

What is happening to our honeybees?

Honeybee on lavender

Honeybees, along with other pollinators, are indicators of environmental health, and a vital link in functioning ecosystems. Yet they face a barrage of new predators and diseases. Now a national centre for beekeeping has been established in recognition of their importance. Its Director, ***PETE BARRAR,*** *describes the threats that honeybees face, and what is being done to meet this challenge.*

You may well have seen some of the recent news on the use of pesticides and the concerns they are raising in relation to our honey bees – *Apis mellifera mellifera* – and other pollinators. The pesticides in question are the neonicotinoids or neonics. These have been around for twenty years or so and are a type of systemic pesticide which is applied to crop seeds with the intention of providing protection throughout the life of the plant. It is this 'life cycle' protection which seems to be creating the main problems for our bees.

Notwithstanding the issues raised by the use of these pesticides, the bees are under threat from a variety of sources and it's often very hard to untangle the complexity of the diverse challenges they face and the inter-relationships between them. I'll consider some of these and return to pesticides in due course!

Bee diseases

Back in April 1992 there was a report in the Guardian headed, "Deadly bee 'rabies' discovered in Devon". This was the discovery of Varroa - *Varroa destructor*, a crab-like parasitic mite visible to the naked eye.

US Department of Agriculture/Wikimedia Commons

Varroa destructor mites expose bees to viral infections

Originating in Central Asia, the mite had finally reached the shores of Britain and was reckoned to be already well established. The mite spread rapidly throughout most of Britain and beekeepers had to learn to manage infestations in their hives. What we hadn't appreciated at the time was the way in which the mites would also expose honey bees to a variety of viral infections. Later on, this combination of mites and viruses would be strongly linked to Colony Collapse Disorder losses in the USA, whilst in the UK varroa and viral infections will continue to figure strongly as one of the causal factors in colony losses.

Further challenges to the honey bee and other pollinators follow from the losses of habitat which result from increasingly intensive farming methods, modern land management in general, and increasing urbanisation. Here in North Wales we are surrounded by hillsides and fields full of sheep and cows which graze on pretty well everything that grows. Wild flower-filled meadows and hedgerows are now rare – gone are the fallow fields and agricultural systems of the past. The loss of wild forage has squeezed our insect populations into narrow corridors – roadside verges and hedgerows, and isolated 'islands' of sustainable pollen and nectar sources.

Following its predecessor, the less virulent intestinal parasite *Nosema apis* (which has been known in Britain since 1912) is another recent challenge, *Nosema ceranae*. This is a microscopic spore-forming parasite which invades the intestinal lining of honey bees, and in some areas this has become endemic, presenting a severe and additional burden for the bees and the beekeeper.

Unpredictable or stochastic weather events have brought some beekeepers to their knees. These tend to have significant local variations but with an overriding trend. Over the past four or five years, cold and wet weather throughout Britain has severely disrupted the natural cycles of the honey bee with the result that pollen and nectar flows have not materialised or have been curtailed. The 'normal' building up of stores just hasn't followed, resulting in low or non-existent crops of local honeys and restricted pollen availability. This has led to lower rates of laying by queens in affected areas, resulting in smaller colonies less able to withstand overwintering.

In August 2012 the National Bee Unit (NBU) at York issued a stark warning to beekeepers to 'check and feed their bees' because inspectors were finding many colonies at risk of starving. These warnings were issued again by the NBU in late March 2013 as the weather still held the country in its icy grip. The weather conditions last summer have also compounded matters through the reduced opportunities for virgin queens to mate successfully, or even at all, with the result that colonies declined or collapsed into unsustainable drone-laying populations. Throughout Britain, colony losses a couple of years ago reached a rate of over 30% a year with only slightly better results for Wales. We await the outcomes for this year as the cold weather persisted well into April and most beekeepers delayed their spring inspections.

Peter Barrar

Bees on rape seed at Bodelwyddan

A new threat

Beekeepers are now starting to prepare themselves for yet another onslaught! The Asian hornet *Vespa velutina nigrithorax* was discovered in south-west France in 2004-05. It is thought that a hibernating queen arrived in a consignment of Chinese garden pots. Since then the hornet has dispersed throughout western France, from the coastal areas in north-east Spain up into the northern parts of Normandy. It has also been reported to have been found in Belgium. Reputedly, the hornet is capable of flying distances of 45km or more, and so is well able to contemplate crossing the channel. This particular predator feeds its young on honey bees. Five to ten hornets are quite capable of decimating a hive, catching foraging bees on the wing before taking the body parts back to their nest. Where a colony becomes seriously weakened, the hornets will enter the hive to catch their prey. These insects construct metre-diameter nests high in the trees and can potentially be quite unpleasant to humans if provoked. Many beekeepers are convinced that it is only a matter of time before the hornet makes it across the channel, so we must be vigilant. French beekeepers are trying to contain the spread of the hornet and are resorting to 'wasp type' beer or jam traps in their apiaries. I have no doubt we will be resorting to this when the hornet

Peter Barrar

Queen rearing cell cups on frame

gets here. What we don't know yet is whether the climatic conditions in Wales might limit their spread or their concentration. Anecdotal evidence from the Pyrenees suggests that the hornets prefer the plains to the mountains.

One of the downsides of increasing internationalisation is the relative ease with which insects and disease can transcend continental land and sea barriers into places where the indigenous species have not evolved to manage or control these threats. The Asian honey bee *Apis cerana* is well able to control

Peter Barrar

Hiving a swarm at Gwydir Castle

the varroa mite by grooming behaviours, but our indigenous European dark bee has not evolved to do this.

It is against this background of natural and man-made circumstances that we now consider the role that neonicotinoids (imidacloprid, clothianidin and thiamethoxam) may well be having on our honey bee populations. There is no doubt that high doses of these chemicals kill bees and most other insects as well. After all, this is what they have been designed to do.

Quite understandably, arguments about the use of these pesticides focus on the scientific evidence available, but this is a complex area and it is not a straightforward matter to decide. In Europe, partial and temporary suspensions of a number of neonicotinoid-based products have been imposed by France, Germany, Italy and Slovenia, but the UK has not done so. Mass poisonings of bees in some of these countries have been put down to incorrectly applied dust coatings on seeds and incorrect applications on flowering crops. Attempts in Europe to introduce a Europe-wide ban were blocked earlier this year by the UK. In January, the European Food Safety Agency came down firmly in support of a ban, stating that neonicotinoids posed an unacceptable risk to bees when used on flowering crops. And in April, a report from the Parliamentary Environmental Audit Committee, an influential cross-party committee of MPs, accused the government of its "extraordinarily complacent approach", relying on scientific studies which were "fundamentally flawed" and of ignoring the "precautionary principle" on which a decision to ban needs to be based.

The multinational manufacturers of these pesticides claim that there is no evidence that their products are harmful to bees, but refuse to publish their own data on the grounds of commercial confidentiality. These arguments will continue and it is clear that more research will be needed if the UK government is to reconsider its position, and this will delay matters further.

In the matter of domestic use of these pesticides through the plethora of products found in garden centres and retailers, a number of major companies including the Co-op, B&Q, Homebase and Wickes, have taken the decision to withdraw sales of these products from their shelves and, in the case of the Co-op, to ban the use of these chemicals from their nationwide farm network.

Matters were brought to a head by the European Commission on the 29th April following a vote by the EU countries – fifteen voted for a ban, including France and Germany, eight voted against a ban, including the UK and Hungary and there were four countries which abstained. The European Commission made the final decision and announced that a two year ban will be applied to three of the most widely used neonics with effect from December 2013. This will give some time for further research by those from all sides of the argument. It's to be hoped that the UK government and industry stakeholders will provide the necessary funding, and that bees and other pollinators will be afforded some protection from this precautionary approach.

Shared responsibility

The wellbeing of our bees and other insect pollinators and their part in the food chain – which includes wild bird populations – and the impact of declining insect numbers on the pollination chances of wild flowers, are largely in our own hands. Beekeepers, farmers, land managers and all those concerned about our environment have a part to play.

Peter Barrar

Queen bee marked white on newly drawn comb

As I write, the Welsh Government (WG) is consulting on its 'Draft Action Plan for Pollinators for Wales'[1]. The aim of the plan "is to reduce, and seek to reverse, the decline in wild and managed pollinator populations". In explanation, the WG argue that, "Pollinators are an essential part of our environment. Honeybees are the main managed pollinator of crops and also provide a crop (honey) themselves. Wild pollinators, which include bumblebees and butterflies, are also important pollinators for crops like fruit and oil seed rape, for clovers, which help to improve pastures for livestock grazing and wild flowers. They contribute to the diversity of plant species, habitats and wildlife. This provides food, makes Wales a better place for people to enjoy and visit and contributes to our economy".

The new National Beekeeping Centre for Wales[2] (NBCW) at Bodnant has taken up the challenge with its aim: "to assist the development of beekeeping in Wales that is vigorous, healthy, and environmentally responsible, through the promotion of good practice, accurate and accessible public information and the involvement of the community." Over nine months we have had nearly 20,000 visitors to our Beekeeping Centre at Furnace Farm, on the Bodnant estate at Tal y Cafn in the Conwy Valley. We are supported by our committed and growing group of volunteers – keen to 'spread the word' and to learn all they can about bees and beekeeping. In addition, the NBCW and the Snowdonia Society are engaged in a joint honeybee queen-rearing and mating project at the Society's Tŷ Hyll property at Capel Curig, with the aim of conserving and providing local dark bees to beekeepers in North West Wales.

There is a strong appetite for conservation amongst the majority of our visitors. They see the honey bee as a 'barometer' for what we are doing to our planet and so it is exceptionally pleasing to see Wales leading from the front in our concern to protect and conserve these wonderful creatures.

*Professor **Pete Barrar** is Director, National Beekeeping Centre for Wales, Bodnant.*

1. http://wales.gov.uk/consultations/environmentandcountryside/pollinator-action-plan/?lang=en
2. Funded by the Welsh Government through the Rural Development Plan, Conwy Rural Partnership/Conwy County Borough Council, Environment Wales, the Snowdonia National Park Authority, Conwy Beekeepers' Association and the Welsh Beekeepers' Association.

Peter Barrar

Worker brood cells and honey arch

Beth sy'n digwydd i'n cacwn?

Mae cacwn, ynghyd â pheillwyr eraill, yn arwyddion o iechyd amgylcheddol, ac yn ddolen hanfodol mewn ecosystemau sy'n gweithio. Eto maent yn wynebu byddin o ysbeilwyr ac afiechydon newydd. Bellach sefydlwyd canolfan cadw gwenyn genedlaethol i gydnabod eu pwysigrwydd. Mae Cyfarwyddwr y Ganolfan, Pete Barrar, yn disgrifio'r bygythiadau y mae'r cacwn yn eu hwynebu, a'r hyn sy'n cael ei wneud i ymateb i'r her hon.

Wikimedia Commons/Public domain

A walk in the fields

Labour-intensive harvest

JULIE BROMILOW reflects on how the Centre for Alternative Technology's research into a sustainable future might impact on the landscape.

Mae JULIE BROMILOW yn myfyrio ar sut gallai ymchwil y Ganolfan Dechnoleg Amgen i ddyfodol cynaliadwy effeithio ar y tirwedd.

Last summer I packed my rucksack and began a 1,024 mile journey on foot around Wales via the new Wales Coast Path and Offa's Dyke. The path hugs the coast but often ventures inland across fields and hills to meander round estuaries and inlets. I camped on dunes and headlands, gazed on ragged cloud and aquiline mountains and listened to the wind carry muffled, haunting cries of curlews across silver mud flats. I climbed Offa's hills, watched fieldfares hustle for berries, and startled tow path ducks.

I crossed a lot of farm land – lost my way in hill fields, was alarmed by skittish bullocks and ogled at by curious sheep. I followed a barrel-bellied cow up a pine track as she gently butted her calf with her short and elegant horns. I ate flapjack by farm gates, and boiled tea and eggs in the shelter of tumble-stone walls. My route took me through many muddy farmyards where sometimes there was a swirl of sheep dogs or the breathy scent of cattle in a barn. Once I met a farmer walking her cows across mud in the rain and once a rosy-cheeked lad raced across

the fields on his quad bike to correct my route. There were few arable fields and they were empty of folk, scarlet pimpernels fringing the wheat. I was surprised once by sherry-cheeked hunters tumbling out of a barn with their guns, blinking in the sun with straw in their jumpers – they were after the grouse I'd seen among the roots of a fallen tree. But it was rare to meet anyone on farmland or on the lanes. Where were all the people?

There were dog walkers of course, and occasional contract workers mending a fence. Volunteers baled heather and cleared paths in places of special conservation interest, and sometimes there were blackberry pickers. But most folk were unseen, gliding past in trains or lorries whose yellow lights trembled the drizzle and roadside weeds. Farmers were always alone in the distance, tossing hay out of tractors and driving away.

I had time to read in my tent – *Wild Wales* by George Borrow. He walked through Wales in 1854 meeting dozens of people on a daily basis, his pages merry with dialogue. In a time without cars and television, women often knitted by the side of the road. But what struck me most in contrast to my own journey was how much the landscape was populated. George Borrow would meet gangs of reapers, drovers, tree fellers and millers, stone breakers, children, masons, pedlars, fiddlers, quarrymen, farmers and peat diggers, and he himself was often mistaken for a pig man.

Wikimedia Commons/Public domain

Welsh spinners at the cottage door

Farming now is a solitary existence. Many remote farms stand derelict with crumbling outbuildings. Yet farming is surely the most vital of occupations. I recently listened to a radio programme about the future of farming in which it was suggested that to farm more efficiently and reduce surplus nitrous oxide (N_2O) emissions we will need drones to assist with flock control and satellites to monitor crops. A reduction in human labour was acknowledged. But it left me feeling uneasy – there must be other ways.

A change of direction?

One very different vision is from The Centre for Alternative Technology (CAT), where researchers working with universities, industry leaders and NGOs have produced a scenario called Zero Carbon Britain. This scenario explores the possibility of reducing Britain's greenhouse gas emissions to zero. It describes how efficiencies can be made in the built environment, transport and energy sectors, and how our reduced energy requirements could be met with a mix of renewable energies. But what makes the research particularly special is the integration of land-use and agriculture into the scenario. In fact land-use is key to achieving zero – it is the only sector which can absorb carbon dioxide (CO_2).

This is a bold piece of research, pushing boundaries by proposing that most food and energy resources would be produced within Britain. This would improve food and energy security, and avoid exploitation of other countries' resources. It is also a giant challenge. How can our densely populated land produce the food and energy we need, sequester our greenhouse gas emissions, and protect our wildlife?

The answer largely depends on a change in diet. Pig and chicken farming would remain at much the same levels as today – their diet is variable and they could

Courtesy ADAS

Aviation fuel from *Miscanthus?*

be fed food and crop waste. But grazing by ruminant animals – sheep and cows – would be reduced by about 80%. Belching ruminants produce large quantities of methane (CH_4), a greenhouse gas with 23 times more global warming potential than CO_2. But the biggest problem with ruminants is efficiency. It takes a lot of land and energy to feed cattle which in turn produce a relatively small amount of meat and dairy. Today our grazing land is often fertilised, but plants which don't take up the nitrogen release it as N_2O – a greenhouse gas 300 times more powerful than CO_2. And we supplement our grazing cattle's diets with extra protein, often soya beans grown on what was Amazon rainforest.

Plant power

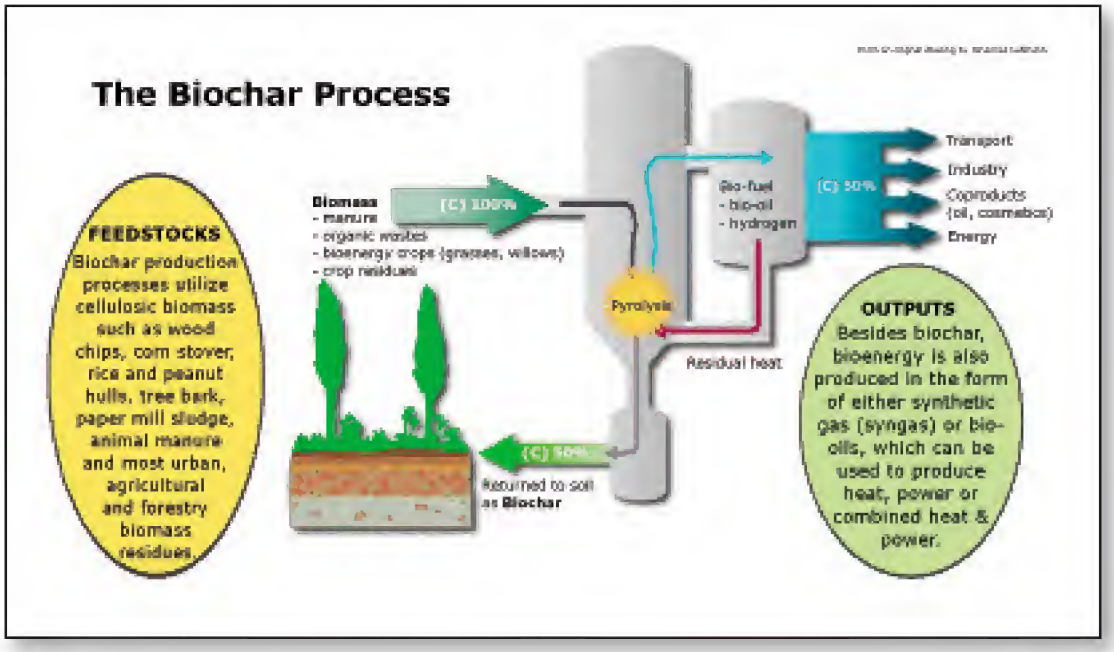
Such a large reduction in grazing would free up land to grow food for humans – legumes and cereals – and energy crops. If all of our energy is to be supplied by renewables, a wide range is required. Most would be from off-shore wind, with smaller contributions from on-shore wind, hydro, solar, tidal, and heat pumps, allowing for a potential expansion in marine technology. But a lot of energy would be made by plants.

Bio-digesters have been around a long time. Domestic versions in many countries have collected methane from rotting animal dung to use as cooking fuel, and large scale operations in Britain do the same with food waste, sewage or slurry. But plant-based fuels have greater energy yields. The resulting methane can be used like natural gas is now – burned for heating, or to make electricity. And the nutrient-rich organic matter left in the digestion tanks can be put back on the land.

Crops can also be used to make transport fuel for vehicles which cannot run on electricity, such as heavy farm machinery and aeroplanes. Bio-kerosene for aviation fuel can be made from woody fibrous crops like miscanthus. You might be surprised to find flying in a zero-carbon scenario. But CAT show that if we are prepared to substantially reduce our consumption of meat and dairy, and reduce our flying to a third of today's levels, we can have a bit of both without exploiting resources from overseas.

There are still CO_2 emissions that need taking care of in the short term, and the answer is to bury them in the form of carbon – after all, timber has been sitting inert in landfill for many years. But CAT's proposed carbon sinks are mostly in the form of bio-char. These will complement existing stores of greenhouse gases such as peat bogs and forests, which would of course be preserved.

In these few words I cannot do justice to the details of six years of work, and this short article will no doubt raise more questions than it answers. How is the electricity provided to produce the bio-kerosene? How will electricity be stored? What changes in legislation would be needed to reduce our food imports? What impact would this have on our overseas producers? What effect will burying bio-char have on the land, and what exactly is bio-char anyway? The answers are in the full Zero Carbon Britain document which is free to download from



From an original drawing by Johannes Lehmann

www.zerocarbonbritain.com You can also contact the researchers to find out more – the third phase of research is due to be completed later this year.

To me this work is brave and positive. I am reassured that if this scenario is put into place, biodiversity would not suffer (and could potentially increase) and that there would be an increase in employment opportunities, particularly in rural livelihoods. It takes courage to respond to the enormous problems of climate change and diminishing resources by challenging the big wheels of politics, commerce and consumerism. This number-crunching shows that achieving zero carbon is technically possible if we are prepared to change our political thinking.

Having read the proposal, not many people argue with this view – criticism to this research has been mostly on aesthetic grounds. Some people want to preserve the landscape they love. To them, reforestation, reduced grazing pastures, polytunnels and tall crops of miscanthus are as abhorrent as wind turbines. I have some sympathy – I love our landscape too, I love the wild and desolate hills. But I feel puzzled at this response. It was not so long ago that our fields were more diverse, producing food for humans, not sheep, and not so very far into the past that the whole of Britain was covered in trees. Change is inevitable and it is our responsibility to choose carefully.

For me it's an easy choice. Smart technology is necessary but I reject drones and monoculture for a future that is more diverse. I want to see agriculture nudging into urban areas, and an increase in city farms and green spaces. I want to see forested hills and mixed farming provide wildlife habitats as well as resources. I want a landscape that contributes to a good quality of life and provides us with energy, transport and food as well as recreation. There will still be wild places and aquiline mountain views, there will still be expansive cinnamon moors, and salt marsh sheep will still wait with the cormorants for the tide to recede. And there might also be the opportunity again to meet people on country lanes, and working in the fields.

Julie Bromilow *was a teacher in Telford and Ghana and for a charity in Sussex. She won a scholarship to research Education for Sustainable Development in Japan, then worked as an education officer for CAT for five years before leaving in 2012 to become a freelance writer.*

Julian Jones

A meadow too small:

the strange case of Crug-y-Byddar

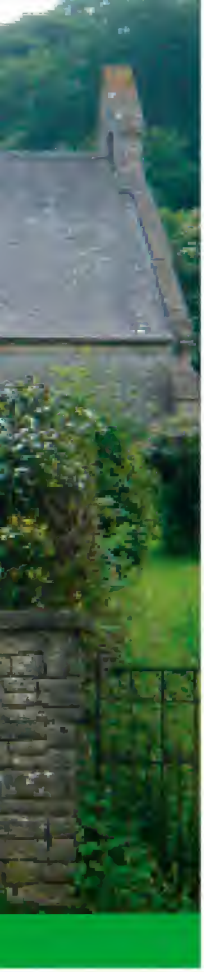
Wildflower meadows are a fragile and disappearing feature of the rural landscape, but as well as oases of natural beauty they have cultural significance. In one case, this significance is all the greater because local parishioners have maintained a churchyard meadow over many years. Conservation value and cultural connections may not be enough to save this small meadow, as JULIAN JONES reports.

Ten years ago I received a call about a meadow with a difference. Lying just inside the Welsh border, the 0.25ha field of orchids and wildflowers was threatened with development, but this special site was a churchyard.

The church itself was being decommissioned by the Church in Wales and had been passed to their land agents – The Representative Body of the Church in Wales.

The former St David's Church in the tiny hamlet of Crug-y-byddar, near the village of Felindre, lies to the north of Knighton in the heart of the Teme valley. This is border country. From its source, you can follow the Teme downstream and spend a day criss-crossing from Wales into England and back again as the river twists and turns its way towards the Severn.

Laid out at the height of the Victorian era, Crug-y-byddar churchyard provides a glimpse of what many fields would once have looked like in the wider countryside; lowland meadow full of knapweed, ox-eye daisies



and sneezewort, interspersed with orchids such as common twayblade, heath and common spotted orchid and greater butterfly orchid.

A disappearing fragment

These wildflower gems are like 'hen's teeth' in today's countryside. Natural England consider that all MG5 lowland meadow grasslands greater than 0.5ha in size should be worthy of designation as SSSI (Richard Jefferson, personal communication).

Despite a number of attempts to achieve better protection for Crug-y-byddar, CCW consider 0.25ha to be too small. Whilst they recognise the high quality of the MG5 habitat in at least part of the churchyard, they have also stated that 0.5ha is the minimum size any plot needs to be to gain SSSI status.

The question of how SSSI are selected is timely, as we move into an era when notifying sites for their nature conservation value seems to be falling out of favour with policy and decision makers. The Ratcliffe criteria – which include attributes such as size of site, species and habitat diversity and rarity – were never intended to be used in such a rigid way as has been exercised at Crug-y-byddar[1].

Liam Robertson

Gtreater butterfly orchid

Similar inflexible interpretations have been placed upon the National Vegetation Classification. You might hear an ecologist say something about a lowland meadow site like "It doesn't really have enough Lotus to be considered really good MG5". Does that really make it a site not worthy of protection?

The countryside is dynamic: selection criteria need to adapt and be flexible to meet the needs of a rapidly changing environment. It is highly likely that Derek Ratcliffe and many others anticipated that the alarming loss of our lowland meadows witnessed in the 1970s and 80s would have stopped or even been reversed by now. Protecting sites like Crug-y-byddar is absolutely vital if we are to re-build biodiversity as set out in England's Lawton Review[2] and Welsh Government's stated aim under Living Wales "to ensure that Wales has increasingly resilient and diverse ecosystems that deliver economic, environmental and social benefits"[3].

Julian Jones

Lowland meadow of a kind rarely seen in the 21st century

Last hope

The future of Crug-y-byddar is currently in limbo. The potential new owners of the old church

Julian Jones

and the MG5 meadow plan to restore the church and create access and garden on half of the MG5, although they would like to look after the orchid area. Understandably they will not complete the purchase unless their planning application to develop the site is approved. This places Powys County Council planning officers in the strange position of having to decide on a proposal that has not been submitted by the current owners, nor the agents / architects of the current owners.

The people of Crug-y-byddar and local parishes like Felindre and Beguildy have helped manage and maintain the churchyard and its lowland meadow over many years. They are resigned to the church being developed and an important local amenity and wildlife site being lost from rural Radnorshire. Protestations to the Church of Wales have fallen on deaf ears.

Hope now lies with Powys County Council and a possible Section 106 Agreement that would place a requirement on any new owner to manage the remaining semi-natural grassland as a hay meadow in perpetuity. An alternative could be to insist on the purchase, creation and management of an area of MG5 to replace that which is likely to be lost; ideally this would be adjacent or nearby the old St David's church. Mitigation like this could involve strewing of green hay, seeding, plugging of plants and might even allow for an investigation into ways of expanding the orchid populations.

Perhaps the inception of Natural Resources Wales provides an opportunity to better protect a wider range of sites of high intrinsic value for wildlife whether or not they have any legal status? What happens at Crug-y-byddar is yet another litmus test of how serious we all are about re-connecting and protecting sites in the wider countryside.

Julian Jones *is Director, Radnorshire Wildlife Trust*

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Dôl rhy fechan: achos rhyfedd Crug-y-Byddar

Mae blodau gwyllt y ddôl yn nodwedd fregus a phrin o'r tirwedd gwledig, ond yn ogystal â bod yn werddonau o harddwch naturiol, mae iddynt arwyddocâd diwylliannol hefyd. Mewn un achos, mae'r arwyddocâd hwn hyd yn oed yn fwy oherwydd bod plwyfolion lleol wedi cynnal dôl mynwent dros flynyddoedd lawer. Mae'n bosibl na fydd gwerth cadwraeth a chysylltiadau diwylliannol yn ddigon i arbed y ddôl fechan hon.

Waiting for a *Sorbus*... then three come along at once

In autumn 2012, Martin Lepší, a Czech PhD student working on whitebeams (*Sorbus*), came to work with me for three months in the National Museum's Department of Biodiversity, funded by the European Union's Erasmus programme. His project was to look at the taxonomy of two whitebeams with five sets of chromosomes (pentaploid) which have evolved uniquely in Wales – the Welsh Whitebeam (*S. cambrensis*) and the Llanthony Valley Whitebeam (*S. stenophylla*). But that is another story.

During his stay, aided by a fresh pair of eyes and a better head for heights than me, Martin also discovered three new whitebeams in Wales. One would have been a delight, but three was a real surprise as I thought I had covered the whitebeams reasonably thoroughly for our BSBI Whitebeam handbook[1]!

The first find was of two trees of a distinctive new member of the *S. latifolia* group, which had evolved by hybridisation between the Wild Service-tree (*S. torminalis*) and a member of the Common Whitebeam group (*S. aria aggregate*) on a cliff at Cwmyoy, Monmouthshire. It was growing with both the Welsh Whitebeam and the Llanthony Valley Whitebeam but, having only three sets of chromosomes, was not directly related to them. The nearest Wild Service-trees were over a mile away so we don't yet know how or where this evolved.

The other two whitebeams were at the stunning whitebeam site Craig y Cilau NNR in Powys (*Natur Cymru* 35:46). For years I have looked for the hybrid between my favourite Least Whitebeam (*S. minima*) and Rowan (*S. aucuparia*), which are both abundant there, and Martin found one tree in a location too scary for my legs. This had four sets of chromosomes, three from Least Whitebeam and one from Rowan; it will be interesting to see how fertile it is, as it could be the first individual of a new species.

The third new whitebeam had strongly toothed, obovate leaves; I had previously collected one plant without realising it was different, but Martin found 10, with possibly another 10 out of reach. This is related to the tetraploid Grey Whitebeam (*S. porrigentiformis*) which grows with it, but has only three sets of chromosomes – it is also a conundrum how this has evolved as there is no suitable diploid parent at Craig y Cilau.

Martin and I will be studying these three whitebeams more over the next few years – none were fruiting in 2012, so a priority will be to see flowers and fruits in 2013. It's funny: you don't get a new SorBUS for a few years then three come along at once.

Tim Rich

Martin with the first new whitebeam at Cwmyoy

1st whitebeam, Cwmyoy

Least Whitebeam × Rowan cross from Craig y Cilau

3rd new whitebeam from Craig y Cilau

Thanks to Jaume Pellicer at Royal Botanic Gardens, Kew, for determining ploidy levels and the Countryside Council for Wales for access permission at Craig y Cilau.

***Tim Rich** is Head of Vascular Plants, Department of Biodiversity & Systematic Biology, Amgueddfa Cymru-National Museum of Wales.*

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Adar Meirionydd / Birds of Meirionydd
Rhion Pritchard
Cambrian Ornithological Society 2012
£7.50 plus £2 P&P
Cheques payable to 'Cambrian OS' to Geoff Gibbs, Fronwen, Valley Road, Llanfairfechan LL33 0ET.

For any enthusiastic natural history recorder the chance to dip into a fresh and updated account of their home patch is always exciting, especially a patch as diverse as Meirionnydd. *Birds of Meirionnydd* did not disappoint. This update has been long overdue since the publication of Peter Hope Jones's *Birds of Meirioneth* in 1974. After the initial rush to check up on species for which one has particular affinities, and knowledge from one's local patches, I could then relax into a very enjoyable publication.

Although, like all counties, Meirionnydd has been subject to widespread modifications across the landscape, its habitats are still relatively diverse, which is reflected in the richness of its avifauna. Records and trends, mostly over the last hundred years or so, are summarised concisely. Breeding birds that have declined to extinction in the county include grey partridge and corncrake. Scarce breeding birds include eider and hobby, whilst specialities include ring ouzel, red grouse and wood warbler. Being mountainous in large part and quite sparsely populated, Meirionnydd is an under-recorded county, so it feels like there are always new discoveries to add to the bank of information collated.

The author is to be congratulated on assembling information from so many different sources and for the speedy summary and publication of records up to 2012. Birds of Meirionnydd is a book I would not want to be without, and at a very reasonable £7.50 it is highly recommended. It is also a juicy appetiser for the eagerly anticipated North Wales Breeding Bird Atlas (due autumn 2013) from the same author and his team, which will delve in more detail into the breeding distribution of resident species in Meirionnydd and beyond.

Dafydd Roberts

Island Child: My life on Skokholm with R M Lockley
Ann Lockley
Gwasg Carreg Gwalch 2013
292 pages
£8.50

Ronald Lockley first went to live on Skokholm in November 1927: the following July he married Doris Shellard, a near neighbour to his previous home just east of Cardiff. Their daughter Ann was born in May 1930 at Martin's Haven, in what was then known as Lower Island Lodge, now much changed as an information centre and appropriately called Lockley Lodge.

Ann made her first crossing to the island a few days later. Numerous family photographs provide a vivid testimonial to her childhood years, while her father's copious diaries tell of the highs and lows of island life. There were certainly many lows, like poor lambing seasons and low prices for fish: on one occasion they even carried their catch to Cardiff but fared no better.

Above all there was the wildlife of Skokholm, especially the birds to be studied, and the establishment of the first Bird Observatory in Great Britain in 1933. From about that time Ann has memories of life on Skokholm and its natural history. For instance, she cannot remember a time when her father was not studying the Manx Shearwaters, especially the little colony on The Knoll, the rock ridge sheltering the buildings from southerly winds.

Memories too of the increasing number of visitors. Among them Julian Huxley, whom she thought of as being long like a caterpillar, so knew him as Mr Caterpillar. Of W. S. Bristowe a spider authority, whose birthday it was during his visit, Doris making him a spider birthday cake. Others included John Buxton who was to marry one of her father's sisters; H. Morrey Salmon who helped build the first Heligoland trap and whose sons were welcome playmates for Ann; and John Fursdon, later to become warden of the island in 1946.

There were at times hazardous boat journeys, pushing off from Martin's Haven in a strong northerly, or passing through the tide races in Jack Sound or round St Anne's Head. Ann says, "I can relive every moment of it still" when describing a near disaster as they planned to cross to Martin's Haven. Her father's diary

simply recorded "we had healthy exercise and excitement, we changed our soaking clothes and had dinner."

Visitors to Skokholm were usually transported from Dale by the Sturley family. Edgar the skipper hardly moved from his place at the tiller; John, amidships; Jim, the youngest, in the bow. Ann loved sitting next to Jim because he wore a dried starfish in his headband.

In the late summer of 1940 island life drew to an end because of the war. After 13 years the Lockley family departed. Everything from that season's preserved gulls eggs to water tanks, furniture and livestock, including sheep and ponies, was transported to the mainland and the start of more pioneering, at Cwmgloyne, and later at Dinas Head north Pembrokeshire.

Indeed, and despite the title, about a third of the book is devoted to these mainland years, an intriguing part of the Lockley story which is often overlooked. As to Ann herself, she helped with the re-opening of Skokholm in 1946, of Skomer just for that season, and later spent some time on Caldey. After qualifying with a Diploma in Dairying she went to New Zealand under their immigration scheme in 1953, married and has lived there ever since, but quite naturally still misses the Pembrokeshire coast.

This is a fascinating book about the Lockley family and not just their life on Skokholm. When you have read it, search for a copy of her father's *Early Morning Island* with more about Ann and Skokholm. There is even a photograph of Jim Sturley complete with starfish!

David Saunders

Mushrooms
Peter Marren
British Wildlife Collection 1
British Wildlife Publishing
2012
272 pages
Hardback
£24.95

This is the first volume of a welcome new series of books on British natural history, British Wildlife Collection. It should shake up the competition, such as the New Naturalist Series, which is not what it once was. I will say more on this later.

Peter Marren is a well-known natural history writer and fungus enthusiast. I anticipated that in *Mushrooms* he would serve up a satisfying meal.

The author begins with an auto-biographical chapter to establish his credentials. Its justification, he says, is that "this will be a conversational book, full of stories that interested me…" I found this non-technical approach refreshing and unexpected, and I looked forward to an entertaining read. There is amusement to be had in the chapters that follow – 'Meet the Mushrooms' and 'What's in a name?', a delightful look at the names of fungi.

Having started so well, in places the lightness of touch runs out, some chapters becoming more like essays than stories. I also found some absences strange. There is a short section on field guides, and a piece on floras and mycotas, but no romp through the fabulous subject of books and fungi, which seems a surprising omission for this author. How could he resist telling the story of the publication of talented mycologist and children's author Beatrix Potter's stunning colour illustrations of fungi in Findlay's *Wayside and Woodland Fungi*?

Strangest of all was his chapter 'Picking for the Pot'. My own obsession with fungi was fired as a student when I discovered the delectability of two species of Boletus which were common under pines on sand dunes yards from my front door. I could not write about fungi without wanting to describe the thrills of mycophagy. Yet Marren, who says he has identified and eaten 200 species, ignores the subject completely, filling this chapter instead with a rehearsal of the debate about whether picking fungi should be allowed or banned. I made my mind up on this one long ago.

The appearance of this new series is good news, and overall this first volume deserves a thumbs-up. I look forward to subsequent volumes, which will probably have relatively modest print-runs, and so could become collectors' items. My interest in collecting New Naturalists has ceased, and I'm ready to switch allegiance to future volumes in the British Wildlife Collection series. However, I should record here that I am very impressed with Michael Proctor's *Vegetation of Britain and Ireland*, a reminder that New Naturalists can be great books, as well as being more substantial than the fairly modest size of *Mushrooms*.

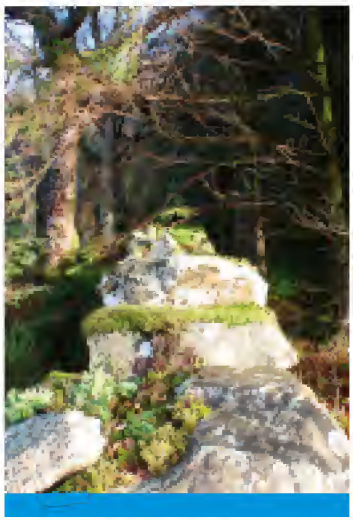
James Robertson

Restoring the Celtic Rainforest: the challenge of a lifetime

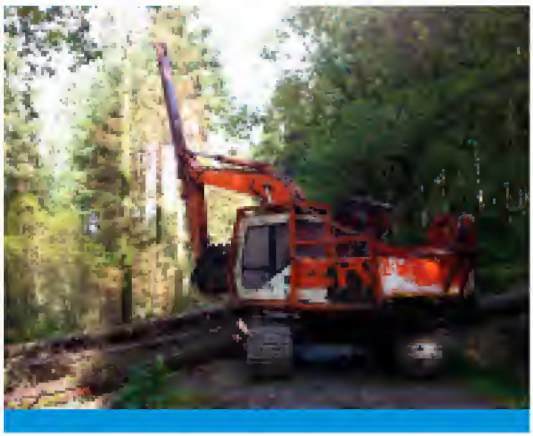
Nestling in a secluded valley above the Mawddach lies Cwm Mynach, a 1000 acre woodland acquired by Coed Cadw in 2010. At the heart of the site is Llyn Cwm Mynach, a glacial lake from which the Afon Cwm Mynach tumbles steeply to meet the estuary below. Visit in spring and you might hear the spinning-coin whirr of the Wood Warbler, spot the darting flight of a Pied Flycatcher or, if you are very lucky, spot an otter hunting for amphibians on the lake shore. The site contains fragments of ancient semi-natural woodland, supporting an impressive 19 species of oceanic lichens. However, in the 1950s came the first wave of commercial forestry, with the planting of the lower valley with Sitka, Norway Spruce and Western Hemlock. A further wave in the late 1960s saw the rapid coniferisation of large areas of the lake catchment.

Now Coed Cadw has embarked upon a gradual process of restoration.

Cadw



Cadw



Successive thinnings of the conifer crop will allow broadleaved trees and woodland ground flora the light they need to flourish and spread, while maintaining a tree canopy across most of the site, safeguarding the ancient woodland remnants that still survive. Over time – perhaps 50 years – the regimented plantations will give way to a more diverse structure and species mix. There is a significant opportunity to expand the area of upland oakwood in the valley and to benefit the myriad species which depend upon it, but nothing happens overnight. As the Site Manager, the challenge for me is to picture the legacy that the work now undertaken will leave for future generations; to adjust to 'tree time'.

The scale of the site offers a rare opportunity to make changes on a catchment scale. In recent years awareness of 'ecosystem services' provided by our natural habitats has developed apace, and the impact of land use on water quality and carbon sequestration are better understood: forestry practices can have wider repercussions, for good or ill. With operations carefully planned and managed to minimise environmental impacts, we expect to see slow improvements in landscape and habitat: but what wider benefits might result? Current literature suggests that the benefits of ancient woodland restoration and conifer conversion may include increased water yield and local water quality, but there are gaps in our knowledge.

At Cwm Mynach we are lucky to have background data, gathered over a period of 25 years as part of the UK Acid Waters Monitoring Network, illustrating the recovery of upland catchments from acid rain. We hope now to work with partners to build on this information and monitor the wider impacts of our management: over time, for instance, we might expect to see nutrient leaching and acidity decline. Such a project demands patience, however. The outcome might be a lifetime away.

Kylie Jones Mattock *is site manager for the Woodland Trust's (Coed Cadw's) woods in Gwynedd, Conwy and Anglesey. A history graduate, Kylie followed the Countryside Management course at Bangor University and has been working in the Welsh environment ever since!*

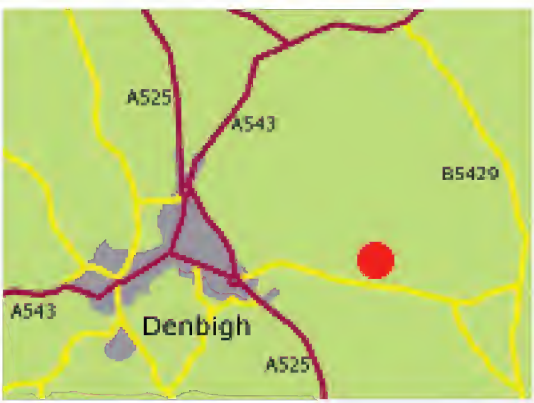
Mynd i'r Eisteddfod?

Yn yr Eisteddfod yn Ninbych eleni (2-10 Awst) bydd *Natur Cymru* yn rhannu stondin rhif 308 gyda'r cylchgrawn Planet a dau o gylchgronau eraill o Gymru – cofiwch bicio draw i ddweud helo.

Mynediad am ddim i wirfoddolwyr

Rydym yn chwilio am wirfoddolwyr i weithio ar y stondin. Os hoffech gynnig help llaw am hanner diwrnod, gallwn drefnu ichi gael **mynediad am ddim**, a gallwch dreulio hanner arall y diwrnod yn mwynhau'r Eisteddfod. **Yn arbennig, byddem yn croesawu pobl sy'n gallu siarad Cymraeg.**

Os oes modd ichi helpu, cysylltwch â Huw Jenkins (07943 576 275 neu huw.naturcymru@btinternet.com).



Going to the Eisteddfod?

At this year's Eisteddfod in Denbigh (2-10 August) *Natur Cymru* will be sharing stall no. 308 with Planet Magazine and two other magazines from Wales – please call in to see us and say hello.

Free admission for volunteers

We are looking for volunteers to help staff the stand: if you'd like to help for half a day we can provide **free admission**, and you'll have the other half a day to explore the Eisteddfod. **We would welcome Welsh speakers in particular.**

Please contact Huw Jenkins if you are able to help (07943 576 275 or huw.naturcymru@btinternet.com)

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British Mammals, Predators & Hunters	05-07-13
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Surveys at the National Botanic Garden

Wildlife surveys have a vital role to play in the care and conservation of our countryside. During the construction of the National Botanic Garden of Wales in the late 1990s, a number of wildlife surveys were undertaken.

Since then, we've conducted quite a few targeted surveys to help us understand and monitor some of the conservation measures and research projects we've carried out on our Waun Las National Nature Reserve. However, within the 160 hectares of the 'formal' Garden, we have not had much more than an RSPB-led bird walk (usually once a year) and a few bat counts, plus fungi, bumblebee and wild flower days.

For the past three years I've had a wildlife camera installed near where we know otters are about, attempting to capture them on camera – without any success. But I did manage to photograph a polecat, and our Bumblebee Day did turn up a tree bumblebee, the first that had been found this far west. All tantalising evidence of what could be found if we only had the time and resources, but a far cry from anything which could be described as systematic.

Now, though, this might be changing. We are very fortunate to have back with us, as a volunteer, one of the people who did many of those initial surveys: Jan Crowden. She is very keen to find out what has been happening over the past 15 years or so since those surveys were done. We are also members of the Carmarthenshire branch of the Wildlife Trust of South and West Wales, as is John James, who

Darren Boxer

recently joined the Garden as a volunteer. So was born the idea of a regular wildlife weekly walk for volunteers and members.

The first of these took place on a bitterly cold and dull afternoon at the end of February, with John, Jan, her husband Keith, and me. Since then, we have been joined by three others in what has become a regular, very leisurely Tuesday morning walk around different areas of the Garden, followed by tea and a chat in the restaurant.

What have we achieved so far? Well, in the past seven weeks, all of which have been dry(!), we have found evidence, in the shape of nibbled hazel nuts, of dormice in two 'new' areas of the Garden; a couple of courting red kites indicates they may be about to breed in the vicinity; and the presence of fresh otter spraint confirmed their presence near the Gatehouse. We've also found evidence of an old badger sett, a couple of very old oak trees which no one knew existed, and some interesting fungi. It is clear, too, that this is a bumper year for scarlet elf cups (see p2).

Not a great deal of new information, but a tantalising glimpse of what is waiting to be discovered. What has also become apparent is how much technology can help. Mobile devices, with cameras and apps which enable us to identify any wildlife we may find, make recording so much easier, in theory at least. Perhaps this could also be a template for other gardens and organisations to follow? Certainly we are hoping that these walks will help us manage the site more sympathetically for biodiversity, and will generate stories which we can then pass on to visitors, through a variety of media.

Currently, this is done via the National Botanic Garden of Wales website, www.gardenofwales.org.uk, in weekly blogs and through various social media platforms. It is likely, also, to feed into general interpretation around the Garden, news releases for especially noteworthy stories, and wildlife-focused guided walks.

***Colin Miles**, Garden volunteer*

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Dilemmas in the rush for renewable energy

Ivor Rees

Tidal turbine at Strangford Lough, N. Ireland

The potential for energy generation from the large tides and tidal currents experienced around Wales has long been obvious. Because water is so much denser, the force of even a moderate tidal current can be equivalent to a strong gale of wind, and it is predictable. The remains of ancient walls for tide mills are still visible in a few inlets and, in a small way, attest to a use once made. What attitude should naturalists, and environmentalists more generally, now take to the rush of large renewable energy schemes being planned for Welsh seas? Inevitably these developments pose uncomfortable dilemmas both for environmental organisations and individuals. Most of us would wish to see significant reduction in CO_2 emissions, but dread the lights going out. At the same time we are averse to impacts on cherished wildlife and reluctant to see the industrialisation of our wild seascapes. Proposals for a Severn Barrage seem have been re-emerging at intervals for several decades. The computer-generated images may get slicker but the arguments to be rehearsed over the wide environmental ramifications and cost / benefit analyses remain broadly the same.

In the last year or so, the conservation agencies and NGOs have been almost overwhelmed by the need to respond to a wide range of other proposals for electricity generating schemes at sea and on the coast. As well as these, there are the possible routes including landfalls for sub-sea power cables. These would come from tidal turbines, from large offshore wind farms further out in the Irish Sea and Bristol Channel, interconnections with Ireland, and a possible undersea link from a new Wylfa nuclear power station to northwest England.

Greater demands for cooling water systems and harbour facilities add to the sense that we are in the midst of an unprecedented surge in the industrial exploitation of local seas. Each different proposal requires careful consideration of the environmental impacts, often calling for some reading between the lines in the welter of documents prepared by developers or their consultants. Given the wide range of newly emerging technologies and novel engineering solutions, it is not easy to extrapolate from effects reported from installations elsewhere in the world. This applies both to variations on the tidal barrage theme, for which there are at least some working examples (Rance, NW France and Anapolis Royale, Nova Scotia) and emerging technologies to generate electricity from tidal currents. In the case of the Rance Barrage, the inlet was closed off from the sea during construction, becoming a freshwater lake. The marine fauna died and it took several years for it to re-establish. An interesting recent report "Bristol Channel Energy: a balanced technology approach" (Nov, 2012), considers the implications of the roll out of new technologies, as well as the unavoidable environmental impacts and the capital costs per megawatt. It makes the case that smaller tidal lagoons and devices, grouped perhaps in tidal fences, would be preferable to one huge barrage construction project.

Of several tidal lagoon proposals one has been suggested for Swansea Bay, east of the dock entrances. For the impoundment wall a novel approach would be the use of large textile bags filled with dredged sand and gravel for the core, with rock just for armouring on the outside. Some of the fill could come from within the lagoon but, as with many Welsh bays, the thickness of marine sand over clay, peat or stones is quite small, so there would inevitably be demands to dredge more widely from the limited aggregate resources elsewhere in the Outer Bristol Channel. Sediment transport, disturbance to sediment contaminated by toxic metals, and other environmental ramifications in the adjoining sea areas all need careful consideration. To marine biologists there is also the challenge of predicting what organisms might thrive in the sheltered and reduced tide range likely to be experienced inside such a lagoon.

In Wales we already have one interesting example of a moderate-sized impoundment subject to altered tides. This is in part of the channel between Holy Island and the rest of Anglesey. Since the mid 19th century two causeways have enclosed the aptly named Inland

Sea. The tide regime here can bewilder those used to normal spring and neap cycles, as the lowest tide levels occur on neaps, not springs, and about two hours before high water outside at Holyhead. Also, the low water level on springs only just overlaps with high water on neaps. The explanation is that restricted flows through the culverts in the two causeways mean that, although tides rise and fall twice daily, the impounded area progressively fills on springs and drains more on neaps. The consequence is an area with unusually interesting ecology including an odd intertidal zonation. It fully merits the SSSI status and, but for the artificial circumstance, might well have been put forward for SAC designation. In the sheltered, reduced tide conditions there are extensive beds of eel grass, including both the *angustifolia* and *marina* forms of *Zostera marina*, as well as *Z. noltei*. Amongst the eel grass, and in some salt marsh pools, Spiral Tassel-weed *Ruppia cirrhosa* occurs at one of the only two locations in Wales where it is presently known. This aquatic flowering plant has very long, sometimes coiled, flower stalks so pollen can be dispersed on the water surface. The Inland Sea is also one of the few places in Wales with a population of the small bivalve *Abra tenuis*. This is unusual in producing young that settle immediately on release without the planktonic dispersal phase of eggs and larvae characteristic of most marine bivalves.

To generate power from tidal currents there are plans to use different and, to some extent still experimental, machines in different places. In the north, between the Skerries and Carmel Head, an array of five towers, similar to the one trialled in the entrance to Strangford Lough, Northern Ireland, are to be deployed. Each tower would carry a pair of twin-bladed turbines on arms that can be raised out of the water for servicing. The towers are to be fixed using pins in holes drilled 11m into the bedrock.

For Ramsey Sound the design is for triangular gravity base frames 36m wide laid on the seabed with turbine pods that swivel to face the current on short pillars at each corner. Potential impacts of both systems on seals and cetaceans are largely unknown, but at Strangford observed effects on animals moving in and out of the lough were less than some had feared. Ramsey Sound, however, is the hottest of hot spots for Porpoises in Wales, and a large group of Bottlenose Dolphins was recently reported to the Seawatch Foundation within one mile of the Skerries. Both Ramsey and the Skerries are pupping places for significant numbers of Grey Seals. Satellite tracking shows that after leaving the beaches young seals may drift back and forth with the tide before moving more purposefully away.

A point made by the authors of the previously mentioned Bristol Channel paper was to urge greater engagement between business and environmental organisations at much earlier stages in the design and choice of locations of marine renewable energy schemes. There may even be viable ways, other than whirling blades, for turning tides into power and less sensitive locations, but for now disconnection and dilemmas remain.

Ivor Rees

Ivor Rees

Eelgrass *Zostera marina*, one of the few fully marine flowering plants, with seeds partly enclosed within the leaf sheath

Cystadleuaeth Gelf *Natur Cymru* Wildlife Art Competition

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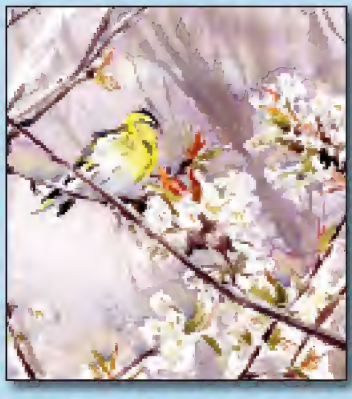
Thank you to all the participants and sponsors of prizes. You can read a full report on our blog site **http://naturcymru.blogspot.co.uk/** The winners are:



Gwobr 1af /1st prize: £250 wedi'i noddi gan/sponsored by WWF Cymru: Chris Wallbank, 'Siskin'

2il wobr/2nd prize: taleb £250 tuag at gost cwrs celf preswyl ym Mhlas Tan y Bwlch /£250 voucher towards the cost of a Plas Tan y Bwlch residential art course: Sharon Whitley, 'Puffin with sand eels'

3edd wobr/3rd prize: trip diwrnod i ddau i Ynys Skomer wedi'i noddi gan Ymddiriedolaeth Natur De a Gorllewin Cymru/day trip for two to Skomer Island sponsored by the Wildlife Trust of South and West Wales: Rich Edwards, 'Jay's feather on moss'

4edd wobr/4th prize: taleb £100 ar gyfer defnyddiau celf wedi'i noddi gan/ a £100 voucher for art materials sponsored by Ken Bromley Art Supplies: Emma Cownie, 'Rabbits'.

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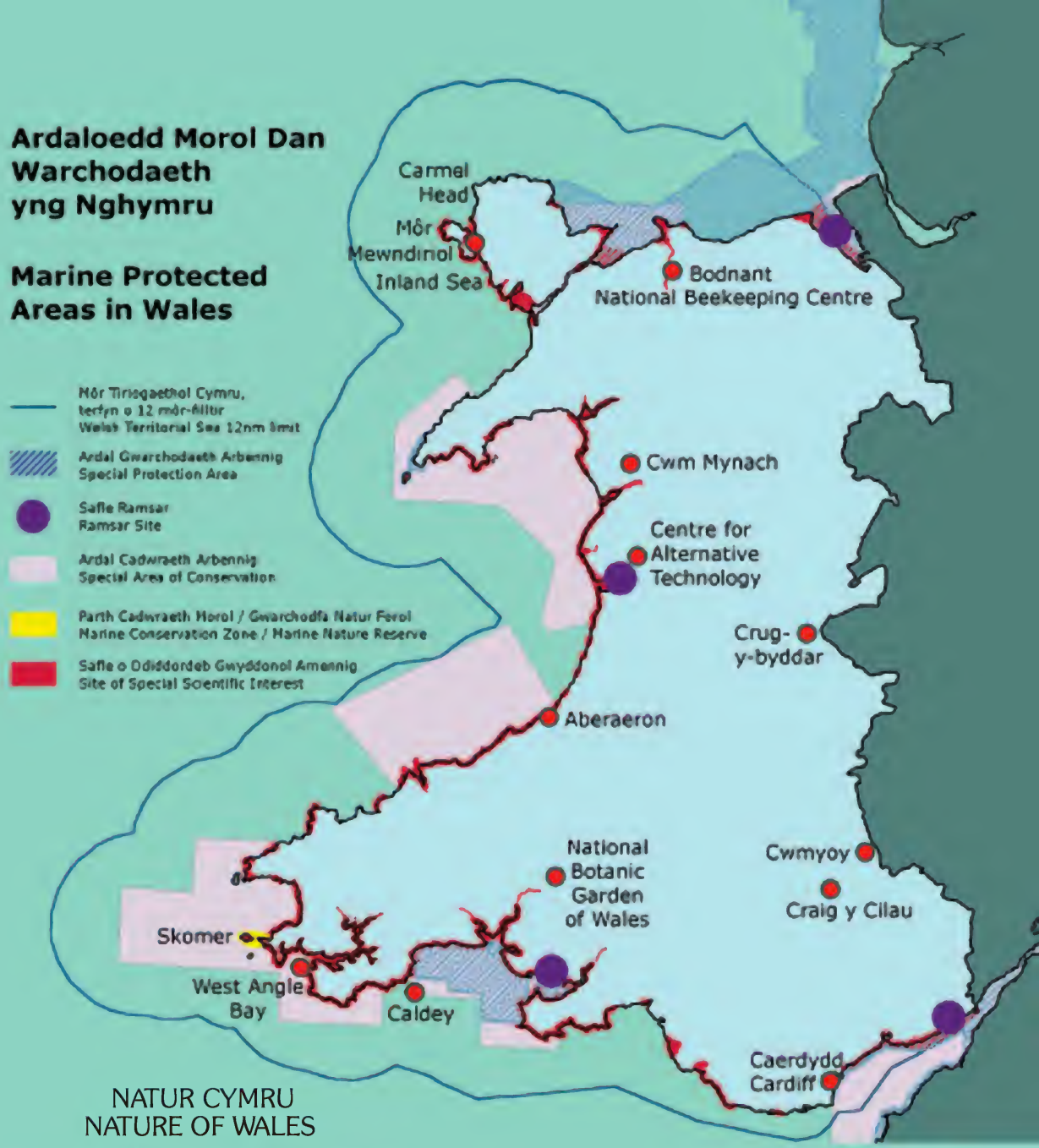

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